The Additional PCCF (C)
Eastern Zone Regional Office
MoEF & CC, Govt. of India
A/3, Chandrasekharpur
Bhubaneswar–751 013 (Odisha)
Email: roez.bsr-mef@nic.in

MD/ENV/ 672 /102 /2020
Date: 26.05.2020

Sub: Submission of Half-yearly compliance status report of Environmental Clearance conditions for the period October'19 - March'20 in respect of Joda East Iron Mine, M/s Tata Steel Ltd.

Reference: Environmental Clearance letter no. J-11015/215/2008-IA.II(M) dated: 29.07.2019.

Dear Sir,

Kindly find attached herewith submitting the six monthly compliance report as on date of Joda East Iron Mine, TATA Steel Ltd. for the period from **October'2019 - March'2020** as per EIA Notification, 2006. Also for the same period vide office memorandum no. Z-11013/57/2014-IA.II (M), dated 29.10.2014, has been incorporated as EC conditions. The same has been mailed in soft copy to your good office with e-mail to roez.bsr-mef@nic.in for your ready reference.

We trust that the measures taken towards environmental safeguards comply with the stipulated environmental conditions. We look forward to your further guidance which shall certainly help us in our endeavor for further improve upon our Environmental Management practices.

Thanking you,

Yours faithfully,

F: M/s Tata Steel Limited,

Head (Planning), OMQ

Encl.: As above

Copy to : The Chairman, Central Pollution Control Board, Southern Conclave, Block 5th & 6th Floors, 1582 Rajdanga Main Road, Kolkata - 700107 (W. B.).
: The Member Secretary, State Pollution Control Board, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit – VIII, Bhubaneswar - 751012 (Odisha).
: The Regional Officer, SPCB, College Road, Baniapata, Keonjhar - 758001 (Odisha).

TATA STEEL LIMITED
Mines Division Joda Keonjhar Odisha 758 034 India
Tel 91 7440037036
Registered Office Bombay House 24 Homi Mody Street Fort Mumbai 400 001
Tel 91 22 66658282 Fax 91 22 66657724

EC COMPLIANCE REPORT PERIOD: Oct'2019 - March'2020

ENVIRONMENTAL CLEARANCE TO
JODA EAST IRON MINE OF TATA STEEL LIMITED

VIDE MoEF's LETTER NO. J-11015/215/2008-IA.II(M), DATED: 11.03.2013,
EC compliance vide letter no J-11015/215/2008-IA.II(M) dated: 7.09.2018 and
EC compliance vide letter no J-11015/215/2008-IA.II(M) dated: 29.07.2019

FOR PRODUCTION OF 12 MTPA (ROM) OF IRON ORE

Special Conditions

Sl. No.	EC Conditions	Compliance Status
Name of Project: Joda East Iron Mine of Tata Steel Limited. **Clearance Letter No.: J-11015/215/2008-IA.II(M), Dated: 11.03.2013.** **Period of Compliance: October 2019 to March 2020.**		
1	No mining activities will be allowed in forest area for which the FC is not available.	**Being Complied With.** The present mining operation is restricted within 567.087 ha of forest land for which Forest Clearance has been obtained under the Forest (Conservation) Act, 1980 vide letter no. F. No. 8-32/1993-FC (vol-II), date: 24.09.2007.
2	The project proponent shall seek and obtain approval under the FC Act for diversion of the entire forest land located within the mining lease within a period of two years w.e.f. 01.02.2013, failing which the mining lease area will be reduced to the non-forest area plus the forest area for which the project proponent has been able to obtain the FC at the end of this time period. In the case of reduction in mine lease area, the project proponent will need to get a revised mining plan approved from the competent authority for reduced area and enter into a new mining lease as per reduced lease area. The EC will be construed to be available for the mining lease area as per the revised mining lease deed.	**Complied.** MoEF & CC has issued a Guideline F. No. 11-599/ 2014-FC, dated: 01.04.2015 in supersession of the Guideline F. No. 11-362/2012-FC, dated: 01.02.2013. At present, mining operation is restricted within 567.087 ha of forest area for which due approval for diversion has already been obtained. In addition, we have also submitted fresh DRP for remaining forest area of 32.425 ha (leaving a total forest area of 9.394 ha for safety zone).
3	The project proponent shall abide by the guidelines dated 01.02.2013 vide no. 1 362/12012-FC put in place by the FC Division of MoEF in respect of cases of mines where at	**Complied.** MoEF & CC has issued a Guideline F. No. 11-599/ 2014-FC, dated: 01.04.2015 in supersession of the

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Name of Project: Joda East Iron Mine of Tata Steel Limited. Clearance Letter No.: J-11015/215/2008-IA.II(M), Dated: 11.03.2013. Period of Compliance: October 2019 to March 2020.		
	present the forest clearance is available to only a part of the forest land involved in the mine	Guideline F. No. 11-362/2012-FC, dated: 01.02.2013.
4	Environmental clearance is subject to obtaining Clearance as may be necessary under the Wildlife (Protection) Act, 1972 from the competent authority	No specific clearance under the Wildlife (Protection) Act, 1972 is required for the project
5	The project proponent shall obtain Consent to Establish and Consent to Operate from the State Pollution Control Board., Orissa and effectively implement all the conditions stipulated therein	**Complied.** Consent to Establish has been obtained from OSPCB vide letter no. 21271/IND-II-NOC-5144, dated: 08.07.2011. Consent to Operate has also been obtained from State Pollution Control Board, Orissa vide letter No. 2737/IND-I-CON-184, dated: 07.03.2020 and the consent order is valid till 31.03.2021.
6	The Company shall submit Within 3 months their policy towards Corporate Environment. Responsibility which should inter-alia provide for (i) Standard operating process /process to bring into focus any infringement /deviation /violation of the environmental or forest norms/conditions, (ii) Hierarchical system or Administrative order of the Company to deal with the environmental issues and for ensuring compliance With the EC conditions and (iii)System of reporting of non-compliances /violations of environmental norms to the Board of Directors of the company and / or Shareholders or stakeholders.	**Complied.** Details on Tata Steel's Policy on corporate Environment Responsibility and other requirements have been submitted to the MoEF vide letter no. MD/ENV/233A/102/2013, Dated. 8th June, 2013. Tata Steel Environmental Policy is attached as **Annexure-1**.
7	The mining operations shall be restricted to above ground water table and it should not intersect the groundwater table. In case of working below the ground water table, prior approval of the Ministry of Environment and Forests and the Central Ground Water Authority shall be obtained, for which a detailed hydrogeological study shall be carried out.	**Complied.** The mining operation is restricted to above ground water table. Mining has not intercepted ground water table. The lowest working depth of our mine pits is at 580m RL, whereas the presence of ground water table has been estimated to be at 498.30 mRL. A detailed hydro-geological study was carried out for

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		the purpose. Ground water level report has been attached as **Annexure-2**
8	The project proponent shall ensure that no natural watercourse and/or water resources shall be obstructed due to any mining operations.	**Being Complied With.** No natural watercourse or water resources are obstructed due to our mining operations. Further, no first order or the second order streams are emanating.
9	The top soil, if any shall temporarily be stored at earmarked site(s) only and it should not be kept Unutilized for long. The topsoil shall be used for land reclamation and plantation.	**Being Complied With.** Since there is very little lateral expansion of mining operations topsoil generation is minimal. Topsoil generated before was stacked at earmarked place and has already been used for plantation purpose. Topsoil being generated is being used concurrently for plantation purpose.
10	As part of Ambient Air Quality monitoring during operational phase of the project the air samples shall also be analysed for their mineralogical composition and records maintained.	**Being Complied With.** As a part of Ambient Air Quality monitor during operational phase of the project the air is also analysed for mineralogical composition. Dust fall analysis report is attached as **Annexure-3**
11	The water recovery and spill way system shall be so designed that the natural water resources are not affected and that no spill water from the plant goes into the Kundra nallah or any other water body	**Being Complied With.** The water recovery and spill way system has been designed such that the natural water resources are not affected and no spill water from the mine goes beyond the lease boundary. The slime is stored in the zero-discharge slime pond. The decanted water from the slime pond is completely recycled back to beneficiation plant within the mine, ensuring zero outside discharge. Photograph of zero discharge slime dam, water recovery system is shown in **Annexure-4**
12	The filter cake shall be disposed at the earmarked site, which shall be above highest water table and shall be lined to prevent any leaching from the filter cake disposal site into groundwater. Efforts shall also be made to gainfully utilize the filter	There is no filter cake generation in our operations.

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	cake so generated in an environmentally compatible manner	
13	Effective safeguard measures such as conditioning of ore with water, regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of particulate matter such as around crushing and screening plant, loading and unloading point and transfer points. It should be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.	**Being Complied With.** For dust Suppression effective safeguard measures such as regular water sprinkling on the haul roads, loading & unloading points is being done. Fixed water sprinklers of cumulative length 3.35 Km have been installed on main and arterial haul roads and in addition two Komatsu HD 465-7 Water Carts of capacity 50 KL & one 28 kL Water Cart of Caterpillar make have been pressed into service for suppression of fugitive dust. Dust suppressants are added to sprinkling water for effective dust suppression. Photographs of Mobile and Fixed water sprinklers, mist canon is attached in **Annexure-5**. All transfer points are equipped with dry fog water sprinkling arrangement. Ambient Air Quality is monitored regularly, and the results are well within the limits prescribed. The results are also sent to the OSPCB office, Bhubaneswar once in every month. AAQ monitoring reports are shown in **Annexure-6.** Results are also sent to the OSPCB office, Bhubaneswar once in every month.
14	The over burden (OB) generated during the mining operation shall be stacked at earmarked dump site(s) only and should not be kept active for long period. There shall be one external OB dump having maximum projected height of 30m with three terraces of 10m each. The overall slope of the dump shall not exceed 27°. The OB dump should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas, use of geo textiles shall be undertaken for stabilization of the dump. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Compliance status should be submitted to the Ministry of	**Being Complied With.** The OB and mineral rejects are being dumped as per the approved mining plan and at earmarked dumping area only. The slopes of the OB dumps are terraced and the overall slope is maintained so as to not exceed 27°. The inactive dump slopes are vegetated with native species. In critical areas, use of geo textiles has been undertaken for stabilization of the dump. The compliance status report is regularly sent to the Regional office, MoEF, Bhubaneswar and SPCB, Orissa once in every six months. OB dump Plantation has been shown in **Annexure7**

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	Environment & Forests and its Regional Office Located at Bhubaneswar on six monthly basis.	
15	Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from mine working, soil, OB and mineral dumps. The water so collected should be utilized for watering the mine area, roads, green belt development etc. The drains should be regularly de-silted particularly after monsoon and maintained properly. Garland drain of appropriate size, gradient and length shall be constructed for both mine pit and OB dump and sump capacity should be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material. Sedimentation pits should be constructed at the corners of the garland drains and designed at regular intervals.	**Being Complied With.** Garland drains of 1418 running meterage all along toe wall which has been completed in FY-20. Upto FY-20 Sedimentation pits of total 11 Nos. have been constructed at the corner of the garland drains to take care of runoff water even during peak rain fall and they are de silted regularly before and after monsoon. Photograph of Garland drain, settling ponds along toe wall and Sedimentation pit are shown in **Annexure 8.**
16	Dimension of the retaining wall at the toe of dumps and OB benches within the mine to check run-off and siltation should be based on the rainfall data.	**Being Complied With.** Retaining walls of dimension 1m x 1m x 0.6m & running meterage of 1418 (FY-20 meters have been provided at the toe of over burden dumps to check run-off. Moreover, another layer of toe wall covering 1500 m length has been provided all along the existing toe walls for better effectiveness. This is being effective to meet the purpose even during peak rain fall. Photograph of retention wall along OB dump is shown in **Annexure-8**
17	Plantation shall be raised in an area of 11 ha including a 7.5m wide green belt in the safety zone around the mining lease by planting the native species around OB dump, reclaimed area, mine benches, along the roads etc. in consultation with the local DFO/Agriculture Department.	**Being Complied With.** Plantation has already been raised in an area of 11 ha including a 7.5m wide green belt in the safety zone around the mining lease by planting the native species around OB dump, reclaimed area, mine benches, along the roads etc. in consultation with the

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		local DFO/Agriculture Department. Till March 2020, we have planted about 7.02 Lakh nos. of plants over an area of 176.76 ha with native species. The density has been maintained at the rate of over 4367 plants per ha. Moreover, vetiver plantation is being carried out over 1 ha with 1,00,000 slips. Plantation over an area of 606.229 ha shall be achieved gradually at the time of post mine closure (Conceptual land use). Photographs of vetiver, safety zone, and dump plantation are shown in **Annexure-9**
18	Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of particulate matter such as around crushing and screening plant loading and unloading point and transfer points. Extensive water sprinkling shall be carried out on haul roads. It should be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.	**Being Complied With.** For dust Suppression effective safeguard measures such as regular water sprinkling on the haul roads, loading & unloading points is being done. Fixed water sprinklers of cumulative length 3.35 Km have been installed on main and arterial haul roads and in addition two Komatsu HD 465-7 Water Carts of capacity 50 KL & one 28 kL Water Cart of Caterpillar make have been pressed into service for suppression of fugitive dust. Dust suppressants are added to sprinkling water for effective dust suppression. Photographs of Mobile and Fixed water sprinklers, mist canon is attached in **Annexure-5**. All transfer points are equipped with dry fog water sprinkling arrangement. Ambient Air Quality is monitored regularly and the results are well within the limits prescribed. The results are also sent to the OSPCB office, Bhubaneswar once in every month. AAQ monitoring reports are shown in **Annexure-6.** Results are also sent to the OSPCB office, Bhubaneswar once in every month.
19	The project authority should implement suitable conservation measures to augment ground water resources in the area in consultation with Regional Director, Central Ground Water Board.	**Complied.** We have submitted Rainwater Harvesting Scheme to CGWB vide letter no. MD/ENV/214/102/2013, dated: 31.05.2013 and same was forwarded to CGWA by CGWB for necessary action vide letter no. 5-22/SER/CGWA/2013-539, dated: 17.06.2013.

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		Rainwater harvesting structures has been constructed at the mine site by the engagement of expertise of M/s. KRG Rainwater Foundation, Chennai and is operational. Photograph of Rain water harvesting pond at JEIM and Joda town is shown in **Annexure-2.**
20	Regular monitoring of ground water level and quality should be carried out by establishing a network of existing wells and constructing new piezometers during the mining operation. The periodic monitoring (at least four times in a year – pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) once in in each season) shall be carried out in consultation with the State Ground Water Board/ Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment and Forests and its Regional Director, Central Ground Water Board. If at any stage, it is observed that the ground water table is getting depleted due to the mining activity, necessary corrective measures shall be carried out.	**Being Complied With.** Ground water quality and Ground water level are being monitored four times a year pre-monsoon (April- May), monsoon (August), post-monsoon (November) and winter (January). The results are being sent to Regional office, MoEF & CC and SPCB, Odisha half yearly. Latest report of Ground Water Quality and Ground Water Level are shown in **Annexure-2**. Since, our mining operations are carried out above the ground water table; there will be no depletion of ground water table because of our mining activity. We also like to mention that because of Rainwater Harvesting structures at Joda East Mine, the ground water level has been increased.
21	The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of surface water required for the project.	**Complied.** Joda East Iron mine has current surface water drawl permission of 8531 KLD. Our operation is now being managed within that quantity. However, for increased requirement of 9000 KL/day of water, we have applied to Department of water Resources, Govt. of Odisha for obtaining drawl permission, which is in active consideration. The permission has been granted from Office of Tahasildar: Barbil via Order No. 423/ Dated Barbil the 16th Feb'1996.
22	The safeguard measures as suggested by the Central Ground Water Board vide letter No. 21-4(231)/CGWA/SER/2010-1010 dated 11.06.2010 shall be effectively implemented.	**Complied.** The safeguard measures as suggested by the Central Ground Water Board vide letter No. 21-

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		4(231)/CGWA/SER/2010-1010, dated:11.06.2010 has been effectively implemented.
23	The project proponent shall practice suitable rainwater harvesting measures on long term basis and work out a detailed scheme for rainwater harvesting, in consultation with the Central Ground Water Authority and submit a copy of the same to the Ministry of Environment and Forests and its Regional Office, Bhubneswar.	**Complied.** After getting NOC from CGWA for ground water withdrawal vide letter no. 21-4(343)/CGWA/SER/2011-956, dated: 27.07.2011, we have submitted Rain Water Harvesting Scheme to CGWB vide letter no. MD/ENV/214/102/2013, dated: 31.05.2013 and same was forwarded to CGWA by CGWB for necessary action vide letter no. 5-22/SER/CGWA/2013-539, dated: 17.06.2013. We have the current NOC of Rainwater harvesting structures has been constructed at the mine site by the engagement of expertise of M/s. KRG Rainwater Foundation, Chennai and is now operational. Photograph of Rain water harvesting pond at JEIM and Joda town is shown in **Annexure-2**
24	Vehicular emission shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of minerals. The vehicles should be covered with a tarpaulin and shall not be overloaded.	**Being Complied With.** Regular vehicular emission testing is being conducted once in every 6 months. The vehicles those who do not meet the emission standard, are withdrawn from operation and maintained properly. A vehicle is kept abeyance from operation till it does not meet the emission standard. Also the vehicles are not run overloaded. Overloading of trucks is avoided to prevent spillage of material.
25	No blasting shall be carried out after the sunset. Blasting operation shall be carried out only during the daytime. Controlled blasting shall be practices. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented.	**Being Complied With.** Blasting is carried out during daytime only. Controlled Blasting is carried out for control of ground vibrations and to arrest fly rocks, as per the recommendations of CIMFR, Dhanbad.
26	Drills shall either be operated with the dust extractors or equipped with water injection system.	**Complied.**

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		Wet drilling is in practice and All drills are also provided with dust suppression system. Photograph of wet drilling is shown in **Annexure-10**
27	Mineral handling area shall be provided with adequate number of high efficiency dust extraction system. Loading and Unloading area including all the transfer points should also have efficient dust control arrangements. These should be properly maintained and operated.	**Being Complied With.** Effective and high efficiency dust extraction systems are in place at the mineral handling plant. Loading and unloading areas including transfer points have been provided with dust suppression facilities. Photographs of dust suppression system are shown in **Annexure-10**
28	Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the Workshop and wastewater generated during the mining Operation.	**Complied.** 6 nos. of Sewage treatment plant have been constructed with capacity 10 KLD, 50 KLD and 630 KLD in residential colony. Further two more STP with 150 KLD is constructed for community. Apart from these STPs in residential colony, Soak pits have been provided inside the mining area because STP constructed in not feasible in the hilly topography of the mine. A 10 KLD ETP has been installed in JEIM for treatment of wastewater generated. The oil catchment pit has also been constructed inside mining area. Photographs of the STPs and Oil catchment pit are shown in **Annexure-11**.
29	Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers should be drawn and followed accordingly.	**Being Complied With.** Pre-placement medical examination and periodical examination of the workers engaged are being conducted & record maintained. The schedule of Periodical Medical Examination is once in every 3 years for the employees of age more than 40 years and once in 5 years for the employees of age less than 40 years. The concentration of Respirable dust at different locations is monitored. The employees are also given regular awareness training on safety and health aspects as part of implementation process of ISO- 45001systems.

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30	Provision shall be made for the housing of construction labour within the site with necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may in the form of temporary structures to be removed after the completion of the project.	All constructional activities for the project have been completed and there was no requirement for construction of temporary housing since the mine has permanent infrastructural facilities.
31	The project proponent shall take all precautionary measures during mining operation for conservation and Protection of endangered fauna namely elephant, sloth bear etc. spotted in the study area. All the safeguard measures brought out in the Wildlife Conservation Plan so prepared specific to this project site and approved by the Chief Conservator of Forest, (Wildlife) shall be effectively implemented. A copy of Wildlife Conservation Plan shall be submitted to the Ministry of Environment and Forest and its Regional Office Bhubaneswar.	**Being Complied With.** Tata Steel is taking all precautionary measures towards conservation and protection of endangered flora and fauna. We have also deposited a sum of Rs. 1,00,66,395/- with the forest department for implementation of the wildlife management plan in order to protect them within our mine and its periphery. Besides that, the mine had prepared Site Specific Wild Life Conservation Plan and it has been approved by the Principle Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden vide letter no. 3195/1WL-SSP-97/2016, dated: 25.04.2016.
32	The critical parameters such as RSPM (Particulate matter with size less than 10 micron i.e., PM10) and NO in the ambient air within the impact zone, peak particle Velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored [(TDS, DO, pH and total suspended solids (TSS)]. The monitored data shall be uploaded on the website of the Company as well as display on a display board at the project site at a suitable location near the main gate of the Company in public domain. The Circular No. J-20012/1/2006-IA.II(M) dated 27.05.2009 issued by Ministry of Environment and Forest which is available on the website of the Ministry	**Being Complied With.** Ambient Air Quality is monitored regularly and the results are shown in **Annexure- 6.** No water is discharged out of the mine premises. Monitoring data is being uploaded on the Company's website www.tatasteelindia.com as part of this report and displayed on a display board at the main entrance gate of the mine. The photograph of display board is shown in **Annexure-12.**

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	www.envfor.nic.in shall also be referred in this regard for its compliance.	
33	A Final Mine closure Plan along with detail of Corpus fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.	**Being Complied With.** A progressive mine closure plan approved by IBM is in place. The final mine closure plan along with details of Corpus fund shall be submitted to the Ministry of Environment & Forests 5 years in advance.

General Conditions

Sl. No.	Condition	Compliance
Name of Project: Joda East Iron Mine of Tata Steel Limited. Clearance Letter No.: J-11015/215/2008-IA.II(M), Dated: 11.03.2013. Period of Compliance: October 2019 to March 2020.		
1	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests	**Being Complied With.** We are operating as per the approved mining technology and scope of working mentioned in Environmental Clearance granted to us and No change in mining technology and scope of working shall been made and adhered to the condition of MoEF&CC.
2	No change in the calendar plan including excavation, quantum of mineral iron ore and waste should be made.	**Being Complied With.** Calendar plan (IBM Approved Mining Plan) prepared for the mine is being strictly adhered to and

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		we are well within the limits specified in Mining Plan as well as EC and CTO granted capacity.
3	At least four ambient air quality-monitoring stations should be established in the core Zone as well as in the buffer zone for RSPM (Particulate matter with size less than 10 micron i.e. PM10) and NOx monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.	**Complied.** Ambient air quality monitoring is regularly being carried out at four different stations within the core zone. The stations were located in consultation with the visiting officers of State Pollution control Board, Orissa. The ambient air quality reports are submitted to Regional office, MoEF, Bhubaneswar and SPCB, Orissa, once in every six months. AAQ monitoring report is attached as **Annexure-6**
4	Data on Ambient Air Quality(RSPM(particulate matter with size less than 10 micron i.e. PM10) and NOx] should be regularly submitted to the Ministry including its Regional office located at Bhubneswar and the State Pollution Control Board / Central Pollution Control Board once in six months	**Being Complied With.** The Ambient Air Quality reports are submitted to Regional office, MoEF, Bhubaneswar and SPCB, Orissa, once in every six months. Please find enclosed the monitoring details in **Annexure-6.**
5	Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained.	**Being Complied With.** Effective water sprinkling is being done on haul roads and at loading and unloading points. Dust suppression systems in the drills have been provided for effective functioning. Dust fall analysis reports are attached as **Annexure-13**
6	Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc should be provided with ear plugs / muffs	**Being Complied With.** High noise areas are earmarked and people working there are provided with ear protection equipment's and the system is ensured by certification to ISO 45001 and regular field audits. Noise quality reports are attached as **Annexure- 14.**
7	Industrial waste water (workshop and waste water from the mine) should be properly collected, treated so as to conform to the	**Being Complied With.**

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Sl. No.	Condition	Compliance
Name of Project: Joda East Iron Mine of Tata Steel Limited. Clearance Letter No.: J-11015/215/2008-IA.II(M), Dated: 11.03.2013. Period of Compliance: October 2019 to March 2020.		
	Standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.	Oil & Grease separation pits have been provided to take care of effluents from the workshop. The same water quality is monitored regularly, and the parameters meet the prescribed standard. There is no wastewater generation from the mines. The result of the workshop effluent is enclosed as **Annexure-15**
8	Personnel Working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.	**Being Complied With.** Adequate dust masks are provided to employees engaged in dusty areas. It is also ensured that they use the same. The employees are also given regular awareness training on safety and health aspects as part of implementation process of ISO 45001 systems. Further, employees undergo Lung Function Tests during the Periodical Medical Examination. Periodical Medical Examination of employees and contractor workers are organized regularly to observe any contractions due to exposure to dust and other occupational hazards.
9	A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive who will report directly to the Head of the Organization	**Complied.** A separate environmental management cell is in place with the people having relevant qualification on environmental science. The Head of the environment department reports to General Manager i.e. the head of the organization.
10	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bhubaneswar.	**Being Complied With.** Funds allocated for environmental management are spent only for environment related purposes and not diverted to any other purpose. During the year 2019-20 till March- 20 an amount of Rs.585 lakhs (approx.) was spent towards environmental protection measures at Joda East Iron Mine. **Annexure-17**
11	The project authorities should inform to the Regional Office located at Bhubaneswar regarding date of financial closing and final	This is a running mine. No specific date for start of land development work can be assigned. However, the copy of the Environmental Clearance has been

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	approval of the project by the concerned authorities and the date of start of land development work.	sent to the Regional Office, MoEF&CC, Bhubaneswar for kind information
12	The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the Officer (s) of the Regional office by furnishing the requisite data / information / monitoring reports.	We extend full co-operation to the officers of the Regional Office during their visit and furnish the required data, information and monitoring reports.
13	The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the Ministry of Environment and Forests, its Regional Office Bhubneswar, the respective Zonal Office of Central Pollution Control Board and the State Pollution Control Board. The proponent shall upload the status of compliance of the environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of Environment and Forests, Bhubneswar, the respective Zonal Officer of CPCB and the SPCB.	**Being Complied With.** Six monthly compliance reports are being submitted regularly to the MoEF, its Regional Office Bhubaneswar, Central Pollution Control Board Kolkata and State Pollution Control Board. Further, the six-monthly compliance reports along with the monitoring results are uploaded in Tata Steel's website www.tatasteel.com and updated periodically. Last six-monthly compliance report was sent vide letter No MD/ENV/423/102/2019, dated:27.11.2019.
14	A copy of the clearance letter shall be sent by the proponent to Concerned Panchayat, Zila Parisad / Municipal Corporation Urban Local Body and the Local NGO, if any, from whom suggestions/ representations if any, were received while processing the proposal. The Clearance letter shall also be put on the website of the Company by the proponent.	**Complied .** A copy of the Environmental Clearance letter was sent to Member Secretary-OSPCB Bhubaneswar and to Addl. PCCF (Central), Eastern Regional Office Bhubaneswar, vide letter nos. MD/ENV/104/102/2013, dated: 14.03.2013 and MD/ENV/105/102/2013, dated: 14.03.2013 respectively. Similarly, A copy of the Environmental Clearance letter was also sent to President (Zila Parishad) - Keonjhar and Chairman (Joda Municipality) vide letter nos.

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		MD/ENV/108/102/2013, dated: 16.03.2013 and MD/ENV/109/102/2013, dated: 16.03.2013 respectively. EC letter has been uploaded on the Tata Steel website, www.tatasteelindia.com
15	The State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and the Collector's office/ Tehsildar's Office for 30 days.	**Complied.** Compiled from State Pollution Control Board, Odisha.
16	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Office of the Ministry of Environment and Forests, Bhubaneswar by email.	**Being Complied With.** The environmental statement for financial year 2018-19 has been submitted to the State Pollution Control Board vide letter no. MD/ENV/346/120/2019, dated:25.09.2017 and the same has been hosted on company's website www.tatasteelindia.com along with half-yearly compliance environmental clearance conditions.
17	The project authority should advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment and Forests at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bhubaneswar	Details of Environmental Clearance about Joda East Iron Mine was published in local newspapers (English Daily, New Indian Express & in oriya (Dainik Jagran) on 16.03.2013.

EC compliance vide letter no J-11015/215/2008-IA.II(M) dated: 7.09.2018

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Sl. No.	EC Condition	Compliance Status
Name of Project: Joda East Iron Mine of Tata Steel Limited. Clearance Letter No.: J-11015/215/2008-IA.II(M) dated: 7.09.2018. Period of Compliance: October 2019 to March 2020.		
1	The Environmental Clearance will not be operational till such time the project proponent complies with all the statutary requirements and judgement of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil)No.114 of 2014 in the matter of common cause verses Union of India and Ors.	**Noted and is complied**
2	Department of Mining & Geology, State govt shall ensure that mining operation shall not commence till the entire compensation levied, for illegal mining paid by the project proponent through their respective department of mining geology in strict compliance of judgement of Hon'ble Supreme Court dated the 2nd August 2017 in Writ petition(Civil) No. 114 of 2014 in the matter of common cause versus union of India and Ors.	**Noted**
3	Monitoring of ambient air quality to be carried out based on the 2009 notification, as amended from time to time by the central pollution control board.	**Noted & is complied**
4	The pollution due to transportation load on the environment will be effectively controlled & water sprinkling will also be done regularly. Vehicles with PUCC only will be allowed to ply. The mineral transportation shall be carried out through covered trucks only and the vehicles carrying the minera shall not be overloaded. POroject should obtain PUC certificate for all the vehicles from authorized pollution testing centre; washing of all transport vehicle should be done inside the mining lease.	**Not applicable** as 100 % mineral transportation is done through rails. And mineral transportation from mines to Railway wagon is done through closed conveyers.
5	The activities and budget earmarked for Environmental Responsibility (CER) shall be as per Ministry's O.M No. 22-65/2017-IA.II(M) dated 01.05.2018 and the action plan on the activities proposed under CER shall be submitted to the Regional Office of the Ministry and State Pollution Control Board.	**Not applicable.**

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EC compliance vide letter no J-11015/215/2008-IA.II(M) dated: 29.07.2019

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Name of Project: Joda East Iron Mine of Tata Steel Limited. Clearance Letter No.: J-11015/215/2008-IA.II(M) dated: 29.07.2019. Period of Compliance: October 2019 to March 2020.		
I	The mining activity will be restricted to the mine lease area for which the earlier EC is granted (i.e. (567.9087 ha (Forest Clearance available) + 62.187 ha= 629.274 ha.). Furthermore, no mining activity will be allowed in remaining forest land (41.819 ha) till PP get the forest clearance.	The present mining operation is restricted within 567.087 ha of forest land for which Forest Clearance has been obtained under the Forest (Conservation) Act, 1980 vide letter no. F. No. 8-32/1993-FC (vol-II), date: 24.09.2007
ii	PP mentioned that the processing of ore at beneficiation plant (old and proposed) will be same as the existing EC capacity (12 MTPA). Three beneficiation units shall be operated at maximum capacity of 5 MTPA for dry processing and 7 MTPA for wet processing (i.e. existing 2.4 MTPA capacity for processing high quality grade of ROM and proposed 4.6 MTPA capacity for processing low quality grade of ROM), respectively, in order, ensure that at any given time, the total beneficiation capacity from all three plants (old dry + old wet + proposed) should not exceed the granted EC capacity of 12 MTPA.	It is being ensured that at any given time, the total beneficiation capacity from all three plants (old dry + old wet + proposed) should not exceed the granted EC capacity of 12 MTPA.
iii	PP should submit an undertaking through affidavit that the total beneficiation capacity from all the three units shall not exceed the granted EC capacity of 12 MTPA at any given time. The operation of this EC amendment is subjected to submission of said affidavit.	This has been noted and complied. The undertaking through affidavit that the total beneficiation capacity from all the three units shall not exceed the granted EC capacity of 12 MTPA at any given time has been submitted.

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iv	State Pollution Control Board should ensure that the processing capacity of beneficiation plants (all three units) should not exceed the granted EC capacity of 12 MTPA at any given time.	**Noted and Agreed Upon.**
V	The amendment in EC shall be operational after submission of an undertaking through affidavit to MoEF&CC within 15 days of receipt of this letter, for compliance of all the conditions prescribed herein and mentioned in EC dated 11.03.2013 and 07.09.2018.	An undertaking through affidavit has been sent to MoEF&CC.

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1.	Project Proponent and Department of Steel & Mines, Govt. of Odisha shall ensure the implementation of recommendations of carrying capacity study report conducted by CSIR-NEERI w.r.t mining proposal of Iron Ore and/or Manganese in the State of Odisha.	All efforts are being made to ensure the implementation of recommendations of carrying capacity study report conducted by CSIR-NEERI. Compliance status has been uploaded to i3ms website as well.
2.	Department of Steel & Mines, Govt. of Odisha should prepare 5 years regional plan for annual iron ore requirement from the state, which in turn shall be met from different mines/zones (e.g. Joda, Koira.) in the state. Accordingly, sustainable annual production (SAP) for each zone/mine may be followed adopting necessary environmental protection measures.	**Noted.**
3.	Project Proponent shall construct the cement concrete road from mine entrance and exit to the main road with proper drainage system	**Complied**.

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	and green belt development along the roads and also construction of road minimum 300 m inside the mine. This should be done within one year for existing mines and new mine should have since beginning. The Department of Steel & Mines, Govt. of Odisha should ensure the compliance and should not issue the Mining Permits, if mine lease holder has not constructed proper cement concrete road as suggested above.	Black top road from mine entrance and exit to the main road with proper drainage system and green belt development along the roads has already been constructed and also road minimum 300 m inside the mine is present.
4.	The Committee observed that as per the recommendations of NEERI report the PP need to ensure Regular vacuum cleaning of all mineral carrying roads aiming at "Zero Dust Resuspension" within 3 months for existing roads.	**Complied.** Since the Ore dispatch from mining lease is 100% through railway siding only hence we don't have any mineral carrying road other than the mining haul road. Regular water sprinkling through fixed and mobile water sprinklers are carried out on haul roads to minimize dust resuspension.
5.	Project Proponent shall monitor the environmental quality parameters as per EC and CTE/CTO conditions, and implementation of suggested measures for control of road dust and air pollution. Odisha State Pollution Control has to ensure the compliance of CTE/CTO. Regional office of the MOEF&CC, Bhubaneshwar shall monitor the compliance of the EC Conditions. Regional office of Indian Bureau of Mines (IBM) shall monitor the compliance of mining plan and progressive mine closure plan. Any violation by mine lease holder may invite actions per the provisions of the applicable acts.	**Complied** Continuous monitoring of different environmental quality parameters as per EC and CTE/CTO conditions with respect to air, noise, water (surface & ground water) and soil quality is already being done via third party agency and monthly reports are submitted to SPCB RO office.
6.	Project Proponent shall ensure the compliance of Suggested Ore Transport Mode (SOTM) with association of the State Government of Odisha. All existing Mines should ensure adoption of SOTM within the	**Complied** EC Capacity based Suggested Ore Transport Mode (SOTM) is 100% by private railway siding which is already in action.

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	next 5 years. New Mines or Mines seeking expansion should incorporate provisions of SOTM in the beginning itself and should have system in place within the next 5 years.	
7.	The State Govt. of Odisha shall ensure dust free roads in mining areas wherever the road transportation of mineral is involved. The road shoulder shall be paved with fence besides compliance with IRC guidelines. All the roads should have proper drainage system and apart from paving of entire carriage width the remaining right of way should have native plantation (dust capturing species). Further, the regular maintenance should also be ensured by the Govt. of Odisha. Progress on development of dust free roads, implementation of SOTM, increased use of existing rail network, development of additional railway network/conveyor belt/ pipelines etc. shall be submitted periodically to Regional Office of the MOEF&CC.	**Noted**
8.	Project Proponent shall develop the parking plazas for trucks with proper basic amenities/ facilities inside the mine. This should be done within one year for existing mines and new mines should have since beginning.	Not applicable as we don't have truck dispatch. All the dispatch is through railway siding only.
9.	Department of Steel &Mine shall ensure the construction of NH 215 as minimum 4 lane road with proper drainage system and plantation and subsequent regular maintenance of the road as per IRC guidelines. Construction of other mineral carrying roads with proper width and drainage system along with road side	**Noted.**

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	plantation to be carried out. This shall be completed within 2 years.	
10.	Regular vacuum cleaning of all mineral carrying roads aiming at "Zero Dust Resuspension" shall be adopted by PWD / NHAI/ Mine Lease Holders within the time Period of3 months for existing roads.	**Complied.** Since the Ore dispatch from mining lease is 100% through railway siding only hence we don't have any mineral carrying road other than the mining haul road. Regular water sprinkling through fixed and mobile water sprinklers are carried out on haul roads to minimize dust resuspension
11.	In case the total requirement of iron ore exceeds the suggested limit for that year, permission for annual production by an individual mine may be decided depending on approved EC capacity (for total actual dispatch) and actual production rate of individual mine during last year or any other criteria set by the State Govt., i.e. Dept. of Steel & Mines. Department of Steel and Mines in consultation with Indian Bureau of Mines-RO should prepare in advance mine-wise annual production scenario as suggested in Table, so that demand for iron ore can be anticipated, and actual production/dispatch does not exceed the suggested annual production.	**Noted**.
12.	R&D studies towards utilization of low-grade iron ore should be conducted through research/academic institutes like IMMT, Bhubaneswar, NML, Jamshedpur, and concerned metallurgical departments in IITs, NITs etc., targeting full utilization of low-grade iron ore (Fe content upto 45% by 2020 and upto 40% by 2025). In fact, life cycle assessment of whole process including environmental considerations should be done for techno-economic and	**Complied.** R&D studies are already going for commercial utilization of low grade ore. We are also in process of installation of 4.6 MTPA Low Grade iron ore Beneficiation plant for which the Environmental Clearance has been granted.

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	environmental viability. R&D studies on utilization of mine wastewater having high concentration of Fe content for different commercial applications in industries such as cosmetics, pharmaceutical, paint industry should also be explored. Responsibility: IBM, Dept. of Steel & Mines, Individual Mine Lease Holders	
13.	The mining activity in Joda-Koira sector is expected to continue for another 100 years, therefore, it will be desirable to develop proper rail network in the region. Rail transport shall not only be pollution free mode but also will be much economical option for iron ore transport. The rail network and/or conveyor belt system upto public railway siding needs to be created. The total length of the conveyor belt system/ rail network to be developed from mines to nearest railway sidings by 11 mines in Joda region is estimated to be about 64 km. Similarly, in Koira region, total length of rail network/ conveyor system for 8 mines (under SOTM 1 & 2) is estimated to be around 95 km. Further, it is suggested to develop a rail network connecting Banspani (Jodaregion) and Roxy railway sidings in Koira region. Responsibility: Dept. of Steel & Mines, Govt. of Odisha and Concerned Mines along with Indian Railways. Time Period: Maximum 7 years (by 2025). The Department of Steel & Mines, Govt. of Odisha should follow-up with the concerned Departments and railways so that proposed proper rail network is in place by 2025.	**Noted.**

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14.	State Govt. of Odisha shall make all efforts to ensure exhausting all the iron & manganese ore resources in the existing working mines and from disturbed mining leases/zones in Joda and Koira region. The criteria suggested shall be applicable while suggesting appropriate lease area and sustainable mining rate. Responsibility: Dept. of Steel & Mines, Govt. of Odisha	**Noted and Agreed Upon**.
15.	**Mining Operations/Process Related:** Project Proponent shall implement the following mitigation measures: (i) Appropriate mining process and machinery (viz. right capacity, fuel efficient) should be selected to carry out various mining operations that generate minimal dust/air pollution, noise, wastewater and solid waste. e.g. drills should either be operated with dust extractors or equipped with water injection system. (ii) After commencement of mining operation, a study should be conducted to assess and quantify emission load generation (in terms of air pollution, noise, waste water and solid waste) from each of the mining activity (including transportation) on annual basis. Efforts should be made to further eliminate/ minimize generation of air pollution/dust, noise, wastewater, solid waste generation in successive years through use of better technology. This shall be ensured by the respective mine lease holders. (iii) Various machineries/equipment selected (viz. dumpers, excavators, crushers, screen plants etc.) and transport means should have optimum fuel/power	**Complied** Appropriate mining process and machinery (viz. right capacity, fuel efficient) has been selected to carry out various mining operations that generate minimal dust/air pollution, noise, wastewater and solid waste. Wet drilling with water injection system and controlled blasting is in operation. Photograph of wet drilling is shown in **Annexure-10.** (ii) Emission load study has been done and reply has been sent to SPCB via MD/ ENV/95 / 102 /2019 on 20.02.2019. Efforts are continuously made to further eliminate/ minimize generation of air pollution/dust, noise, wastewater, solid waste generation through use of better technology. (iii) We have a fully-fledged Equipment Maintenance centre where all data related to machineries/equipment are already recorded. Maintenance is carried out as per schedule. (iv) Digital processing of the entire lease area using remote sensing technique is carried out regularly for monitoring land use pattern and mining activity taken place. Also, the extent of pit area excavated has been demarcated based on remote sensing analysis. This is being done by M/s Geo Consultant Pvt. Ltd which is an authorised organisation of

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	consumption, and their fuel/power consumption should be recorded on monthly basis. Further, inspection and maintenance of all the machineries/ equipment/ transport vehicles should be followed as per manufacturer's instructions/ recommended time schedule and record should be maintained by the respective mine lease holders. (iv) Digital processing of the entire lease area using remote sensing technique should be carried out regularly once in 3 years for monitoring land use pattern and mining activity taken place. Further, the extent of pit area excavated should also be demarcated based on remote sensing analysis. This should be done by ORSAC (Odisha Space Applications Centre, Bhubaneswar) or an agency of national repute or if done by a private agency, the report shall be vetted/ authenticated by ORSAC, Bhubaneswar. Expenses towards the same shall be borne by the respective mine lease holders.	ORSAC (Odisha Space Applications Centre, Bhubaneswar). The Land Use Land Cover Map has been attached of FY-20 has been attached at **Annexure-18.**
16)	**Air Environment Related**: Project Proponent shall implement the following mitigation measures: (i) Fugitive dust emissions from all the sources should be controlled regularly on daily basis. Water spraying arrangement on haul roads, loading and unloading and at other transfer points should be provided and properly maintained. Further, it will be desirable to use water fogging system to minimize water consumption. It should be ensured that the ambient air quality parameters conform to the norms prescribed by the CPCB in this regard.	**Being Complied With.** (i)Fugitive dust emissions from all the sources are controlled regularly on daily basis. Effective safeguard measures such as regular water sprinkling on the haul roads, loading & unloading points for effective dust suppression are being done. Fixed water sprinklers have been put into operation on the main haul road in addition to two 50 KL & one 28 KL mobile water tankers and dust suppressants are added into the sprinkling water for effective dust suppression. Photographs of Mobile and Fixed water sprinklers, mist canon is attached in **Annexure- 5** Photographs of dust suppression system are shown in **Annexure-10**

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	(ii) The core zone of mining activity should be monitored on daily basis. Minimum four ambient air quality monitoring stations should be established in the core zone for SPM, PM10, PM2.5, SO2, NOx and CO monitoring. Location of air quality monitoring stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board (based on Emission Load Assessment Study). The number of monitoring locations may be more for larger capacity mines and working in larger area. Out of four stations, one should be online monitoring station in the mines having more than 3 MTPA EC Capacity. (iii) Monitoring in buffer zone should be carried out by SPCB or through NABET accredited agency. In addition, air quality parameters (SPM, PM10, PM2.5, SO2, NOx and CO) shall be regularly monitored at locations of nearest human habitation including schools and other public amenities located nearest to source of the dust generation as applicable. (iv) Emissions from vehicles as well as heavy machinery should be kept under control and regularly monitored. Measures should be taken for regular maintenance of vehicles used in mining operations and in transportation of mineral. (v) The vehicles shall be covered with a tarpaulin and should not be overloaded. Further, possibility of 3 using closed container trucks should be explored for direct to destination movement of iron ore.	(ii)Ambient Air Quality is monitored regularly and the results are well within the limit prescribed. The results are also sent to the OSPCB office, Bhubaneswar once in every month. AAQ monitoring reports are shown in **Annexure 6** results are also sent to the OSPCB office, Bhubaneswar once in every month. Total 6 ambient air quality monitoring stations are established in the core zone for SPM, PM10, PM2.5, SO2, NOx and CO monitoring. Out of them 2 are online continuous system and weekly twice monitoring is done with the help of other four. Frequency will be increased to daily from FY-20 onwards. Average Air Quality Report has been attached at **Annexure- 6**. (iii) Monitoring in buffer zone is carried out regularly with air quality parameters (SPM, PM10, PM2.5, SO2, NOx and CO) at 4 locations of nearest human habitation including schools and other public amenities located nearest to source of the dust generation as applicable and attached as **Annexure - 6.** (iv) Emissions from vehicles as well as heavy machinery are kept under control and regularly monitored. All vehicles are PUC certified. (v) Not applicable as the Minerals are transported through closed conveyors and Railway Wagons through Rapid Loading System.

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	Air quality monitoring at one location should also be carried out along the transport route within the mine (periodically, near truck entry and exit gate)	
17.	**Noise and Vibration Related**: Project Proponent shall implement the following mitigation measures: (i) Blasting operation should be carried out only during daytime. Controlled blasting such as Nonel, should be practiced. The mitigation measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented. (ii) Appropriate measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs/muffs. (iii) Noise levels should be monitored regularly (on weekly basis) near the major sources of noise generation within the core zone. Further, date, time and distance of measurement should also be indicated with the noise levels in the report. The data should be used to map the noise generation from different activities and efforts should be made to maintain the noise levels with the acceptable limits of CPCB (CPCB, 2000) (iv) Similarly, vibration at various sensitive locations should be monitored at least once in month and mapped for any significant changes due to successive mining operations.	**Being Complied With.** (i)Blasting is carried out during day time only. Controlled Blasting is carried out for control of ground vibrations and to arrest fly rocks, as per the recommendations of CIMFR, Dhanbad. (ii) Appropriate measures are taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. are provided with ear plugs/muffs. However, closed AC Cabins have been provided in all the HEMM for controlling exposure to noise. Average Noise quality reports are attached as **Annexure- 14.** (iii) Noise levels are monitored regularly (on weekly basis) near the major sources of noise generation within the core zone. Average Noise quality reports are attached as **Annexure- 14.** (iv) Vibration monitoring is carried out after he end of each blast and mapped for any significant changes due to successive mining operations.
18.	**Water/Wastewater Related:** Project Proponent shall implement the following mitigation measures	**Being Complied With.** i.)The mining operation is restricted above the ground water table. There has been no intersection of

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	(i) In general, the mining operations should be restricted to above ground water table and it should not intersect groundwater table. However, if enough resources are estimated below the ground water table, the same may be explored after conducting detailed geological studies by GSI and hydro-geological studies by CGWB or NIH or institute of national repute, and ensuring that no damage to the land stability/ water aquifer system shall happen. The details/ outcome of such study may be reflected/incorporated in the EIA/EMP report of the mine appropriately. (ii) Natural watercourse and/or water resources should not be obstructed due to any mining operations. Regular monitoring of the flow rate of the springs and perennial nallas should be carried out and records should be maintained. Further, regular monitoring of water quality of nallas and river passing thorough the mine lease area (upstream and downstream locations) should be carried out on monthly basis. (iii) Regular monitoring of ground water level and its quality should be carried out within the mine lease area by establishing a network of existing wells and constructing new piezometers during the mining operation. The monitoring should be carried out on monthly basis. (iv) In order to optimize water requirement, suitable conservation measures to augment ground water resources in the area should be undertaken in consultation with Central Ground Water Board (CGWB). (v) Suitable rainwater harvesting measures on long term basis should be planned and	ground water table. The lowest working depth of our mine pits is at 580 m RL, whereas the presence of ground water table has been estimated to be at 494 mRL. A detailed hydro-geological study was carried out for the purpose.Ground water level report has been attached as **Annexure-2** ii.)No natural watercourse or water resources are obstructed due to our mining operations. Further, no first order or the second order streams are emanating. Regular monitoring of th flow rate of the springs and perennial nallas along with water quality monitoring is sent on monthly basis to Regional office, MoEF&CC and SPCB, Odisha as part of CTO compliance. Reports in **Annexure-16** **iii.)** Ground water quality and Ground water level are being monitored four times a year pre-monsoon (April- May), monsoon (August), post-monsoon (November) and winter(January). The results are being sent to Regional office, MoEF&CC and SPCB, Odisha half yearly. Latest report of Ground Water Quality and Ground Water Level are shown in **Annexure-2.** iv) To optimize water requirement, suitable conservation measures to augment ground water resources in the area should be undertaken in consultation with Central Ground Water Board (CGWB). v)After getting NOC from CGWA for ground water withdrawal vide letter no. 21-4(343)/CGWA/SER/2011-956, dated: 27.07.2011, we have submitted Rain Water Harvesting Scheme to CGWB vide letter no. MD/ENV/214/102/2013, dated: 31.05.2013 and same was forwarded to CGWA by CGWB for necessary action vide letter no. 5-22/SER/CGWA/2013-539. We have the current NOC of Rainwater harvesting structures has been constructed at the mine site by the engagement of expertise of M/s. KRG Rainwater Foundation,

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	implemented in consultation with CGWB, to recharge the ground water source. Further, CGWB can prepare a comprehensive plan for the whole region. (vi) Appropriate mitigation measures (viz. ETP, STP, garland drains, retaining walls, collection of runoff etc.) should be taken to prevent pollution of nearby river/other water bodies. Water quality monitoring study should be conducted by State Pollution Control Board to ensure quality of surface and ground water sources on regular basis. The study can be conducted through NABL/ NABET approved water testing laboratory. However, the report should be vetted by SPCB. (vii) Industrial wastewater (workshop and wastewater from the mine) should be properly collected, treated in ETP so as to conform to the discharge standards applicable. viii) Oil and grease trap should be installed before discharge of workshop effluents. Further, sewage treatment plant should be installed for the employees/colony, wherever applicable. (ix) Mine lease holder should ensure that no silt originating due to mining activity is transported in the surface water course or any other water body. Appropriate measures for prevention and control of soil erosion and management of silt should be undertaken. Quantity of silt/soil generated should be measured on regular basis for its better utilization. (x) Erosion from dumps site should be protected by providing geo-textile matting	Chennai and is now operational. Photograph of Rain water harvesting pond at JEIM and Joda town is shown in **Annexure-2** vi)Appropriate mitigation measures (viz. ETP(Canteen Effuent), STP, garland drains, retaining walls, collection of runoff etc.) has been taken care to prevent pollution of nearby river/other water bodies. Water quality monitoring is regularly carried out and report is submitted to SPCB. (vii) All the Industrial wastewater (workshop and wastewater from the mine) is properly collected, treated and again used in the process. Monitoring results are attached in **Annexure-16** viii) 5 nos. of Sewage treatment plant have been constructed with capacity 10 KLD, 50 KLD and 630 KLD in residential colony. Further two more STP with 150 KLD is constructed for community. Apart from these STPs in residential colony, Soak pits have been provided inside the mining area because STP constructed in not feasible in the hilly topography of the mine.The oil catchment pit has also been constructed inside mining area. Photographs of the STPs and Oil catchment pit are shown in **Annexure-11** (ix) No silt originating due to mining activity is transported in the surface water course or any other water body. Appropriate measures for prevention and control of soil erosion and management of silt has been undertaken. Quantity of silt/soil generated is minimal. (xi) Trenches / garland drain and retaining wall of running meterage of 2663 meters with settling pits, have been constructed all along the OB dumps to prevent run off of water and flow of sediments directly into the natural stream. Adequate number of

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	or other suitable material, and thick plantation of native trees and shrubs should be carried out at the dump slopes. Further, dumps should be protected by retaining walls. (xi) Trenches / garland drain should be constructed at the foot of dumps to arrest silt from being carried to water bodies. Adequate number of check dams should be constructed across seasonal/perennial nallas (if any) flowing through the mine lease areas and silt be arrested. De-silting at regular intervals should be carried out and quantity should be recorded for its better utilization, after proper soil quality analysis. (xii) The water so collected in the reservoir within the mine should be utilized for the sprinkling on hauls roads, green belt development etc. (xiii) There should be zero waste water discharge from the mine. Based on actual water withdrawal and consumption/ utilization in different activities, water balance diagram should be prepared on monthly basis, and efforts should be made to optimize consumption of water per ton of ore production in successive years. Responsibility: Individual Mine Lease Holders, SPCB and CGWB.	check dams has been constructed across seasonal/perennial nallas. **Annexure-8** (xii) All the water collected in the reservoir within the mine is utilized for the sprinkling on hauls roads, green belt development etc. (xiii) All the efforts has been already taken care to make zero waste water discharge mine. Based on actual water withdrawal and consumption/ utilization in different activities, water balance diagram is being prepared on monthly basis, and efforts are made to optimize specific water consumption in successive years.
19.	**Land/ Soil/ Overburden Related:** Project proponent shall implement the following mitigation measures: (i) The top soil should temporarily be stored at earmarked site(s) only and it should not be kept unutilized for long (not more than 3 years or as per provisions mentioned in the	**Being Complied With.** i.)Since there is no longitudinal mining going on right now, so no top soil generation is going on. Whatever top soil generated before was stacked at earmarked place and has already been used for plantation purpose.

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	mine plan/ scheme). The topsoil should be used for land reclamation and plantation appropriately. (ii) Fodder plots should be developed in the non-mineralised area in lieu of use of grazing land, if any. (iii) Over burden/ low grade ore should be stacked at earmarked dump site(s) only and should not be kept active for long period. The dump height should be decided on case to case basis, depending on the size of mine and quantity of waste material generated. However, slope stability study should be conducted for larger heights, as per IBM approved mine plan and DGMS guidelines. The OB dump should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas, use of geo textiles should be undertaken for stabilization of the dump. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Proper records should be maintained regarding species, their growth, area coverage etc. "(iv) Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from mine operation, soil, OB and mineral dumps. The water so collected can be utilized for watering the mine area, roads, green belt development etc. The drains should be regularly de-silted, particularly after monsoon and should be maintained properly. Appropriate documents should be maintained. Garland drain of appropriate size, gradient and length should be constructed for mine pit, soil. OB and mineral dumps and sump capacity should be	ii.) Since the mining is on hill top there is no grazing land. However, the vetiver grass plantation has been done which also stabilizes slopes. iii)The OB and minerals rejects are being dumped as per the approved mining plan and at earmarked dumping area only. The slopes of the OB dumps are terraced and the overall slope is maintained. The inactive dump slopes are vegetated with native species. The compliance status report is regularly sent to the Regional office, MoEF, Bhubaneswar and SPCB, Orissa once in every six months. Photograph of OB dump plantation shown in **Annexure-7.** **iv)** Trenches / garland drain and retaining wall of running meterage of 2663 meters with settling pits, have been constructed all along the OB dumps to prevent run off of water and flow of sediments directly into the natural stream. Adequate number of check dams has been constructed across seasonal/perennial nallas. Catch drains, siltation ponds and the garland drains are de-silted at regular intervals **Annexure-8.** (v) Backfilling of mined out pits is done as per approved mining plan/scheme. There is no OB dumps outside the mine lease area. The backfilled area will be afforested, aiming to restore the normal ground level. Monitoring and management of rehabilitated areas is carried till the vegetation is established and becomes self-generating. (vi) Hazardous waste such as, waste oil, lubricants, resin, and coal tar etc. are disposed off as per provisions of Hazardous Waste Management Rules, 2016, as amended from time to time and annual return is submitted as Form 4.

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	designed with appropriate safety margin based on long term rainfall data. Sump capacity should be provided for adequate retention period to allow proper settling of silt material. Sedimentation pits should be constructed at the corners of the garland drains and de-silted at regular intervals." (v) Backfilling should be done as per approved mining plan/scheme. There should be no OB dumps outside the mine lease area. The backfilled area should be afforested, aiming to restore the normal ground level. Monitoring and management of rehabilitated areas should continue till the vegetation is established and becomes self-generating. (vi) Hazardous waste such as, waste oil, lubricants, resin, and coal tar etc. should be disposed off as per provisions of Hazardous Waste Management Rules, 2016, as amended from time to time. Responsibility: Individual Mine Lease Holder.	
20.	**Ecology/Biodiversity (Flora-Fauna) Related**: Project Proponent shall implement the following mitigation measures. (i) All precautionary measures should be taken during mining operation for conservation and protection of endangered fauna namely elephant, sloth bear etc. spotted in the study area. Action plan for conservation of flora and fauna should be prepared and implemented in consultation with the State Forest and Wildlife Department within the mine lease area, whereas outside the mine lease area, the	i)Tata Steel is taking all precautionary measures towards conservation and protection of endangered flora and fauna. We have also deposited a sum of Rs. 1,00,66,395/- with the forest department for implementation of the wildlife management plan in order to protect them within our mine and its periphery. Besides that, the mine had prepared Site Specific Wild Life Conservation Plan and it has been approved by the Principle Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden vide letter no. 3195/1WL-SSP-97/2016, dated: 25.04.2016. ii) Plantation has been in safety zone, waste dump slopes & gaps etc. Till March 2020, we have planted about 7.02 Lakh nos. of plants over an area of 176.76

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	same should be maintained by State Forest Department. (ii) Afforestation is to be done by using local and mixed species saplings within and outside the mining lease area. The reclamation and afforestation is to be done in such a manner like exploring the growth of fruit bearing trees which will attract the fauna and thus maintaining the biodiversity of the area. As afforestation done so far is very less, forest department needs to identify adequate land and do afforestation by involving local people in a time bound manner. (iii) Green belt development carried out by mines should be monitored regularly in every season and parameters like area under vegetation/plantation, type of plantation, type of tree species /grass species/scrubs etc., distance between the plants and survival rate should be recorded. (iv) Green belt is an important sink of air pollutants including noise. Development of green cover in mining area will not only help reducing air and noise pollution but also will improve the ecological conditions and prevent soil erosion to a greater extent. Further, selection of tree species for green belt should constitute dust removal/dust capturing plants since plants can act as efficient biological filters removing significant amounts of particulate pollution. Thus, the identified native trees in the mine area may be encouraged for plantation. Tree species having small leaf area, dense hair on leaf surface (rough surface), deep channels on leaves should be included for plantation.	ha with native species. The density has been maintained at the rate of over 4367 plants per ha. Moreover, vetiver plantation is being carried out over 1 ha with 1,00,000 slips. Plantation over an area of 606.229 ha shall be achieved gradually at the time of post mine closure (Conceptual land use). Photographs of vetiver, safety zone, and dump plantation are shown in **Annexure-9.** (iii) Green belt development has been carried out in the 7.5 m inside mines is being monitored regularly in every season and parameters like area under vegetation/plantation, type of plantation, type of tree species /grass species/scrubs etc., distance between the plants is being recorded to maintain density and survival rate. **Annexure-9.** **iv)** Plantation has been raised in the mining area including a 7.5m wide green belt in the safety zone around the mining lease by planting the native species around OB dump, reclaimed area, mine benches, along the roads with native trees in the mine area has been encouraged for plantation. Tree species having small leaf area, dense hair on leaf surface (rough surface), deep channels on leaves has been included for plantation. v) Vetiver plantation on inactive dumps has been encouraged as the grass species has high strength of anchoring besides medicinal value. vetiver plantation is being carried out over 1 ha with 1,00,000 slips vi) At present, mining operation is restricted within 567.087 ha of forest area for which due approval for diversion has already been obtained. Compensatory afforestation and avenue plantation has been raised with recorded and documented details has been submitted to MOEF&CC.

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	(v) Vetiver plantation on inactive dumps may be encouraged as the grass species has high strength of anchoring besides medicinal value. (vi) Details of compensatory afforestation done should be recorded and documented by respective forest divisions, and State Forest Department should present mine-wise annual status, along with expenditure details. Responsibility: Individual Mine Lease Holders and State Forest & Wildlife department.	
21	**Socio-Economic Related:** Project Proponent shall implement the following mitigation measures: (i) Public interaction should be done on regular basis and social welfare activities should be done to meet the requirements of the local communities. Further, basic amenities and infrastructure facilities like education, medical, roads, safe drinking water, sanitation, employment, skill development, training institute etc. should be developed to alleviate the quality of life of the people of the region. (ii) Land outees and land losers/affected people, if any, should be compensated and rehabilitated as per the national/state policy on Resettlement and Rehabilitation. (iii) The socio-economic development in the region should be focused and aligned with the guidelines/initiatives of Govt. of India/ NITI Aayog / Hon'ble Prime Minister's Vision centring around prosperity, equality,	**Being Complied With.** (i)Public interaction is being done on regular basis and social welfare activities is done to meet the requirements of the local communities. Further, basic amenities and infrastructure facilities like education, medical, roads, safe drinking water, sanitation, employment, skill development, training institute etc. has been developed to alleviate the quality of life of the people of the region with CSR activities. (ii) Mining has been going on since a very long time hence there are no land outees and land losers. (iii) The socio-economic development in the region has been focused and aligned with the guidelines/initiatives of Govt. of India/ NITI Aayog / Hon'ble Prime Minister's Vision centring around prosperity, equality, justice, cleanliness, transparency, employment, respect to women, hope etc. This is being achieved by providing adequate and quality facilities for education, medical and

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	justice, cleanliness, transparency, employment, respect to women, hope etc. This can be achieved by providing adequate and quality facilities for education, medical and developing skills in the people of the region. District administration in association with mine lease holders should plan for "Samagra Vikas" of these blocks well as other blocks of the district. While planning for different schemes in the region, the activities should be prioritized as per Pradhan Mantri Khanij Kshetra Kalyan Yojna (PMKKKY). Notified by Ministry of Mines, Govt. of India, vide letter no. 16/7/2017- M.VI part dated September 16, 2015. Responsibility: District Administration and Individual Mine lease holder.	developing skills in the people of the region by TSRDS wing of Tata Steel. Activities are prioritized as per Pradhan Mantri Khanij Kshetra Kalyan Yojna (PMKKKY). Notified by Ministry of Mines, Govt. of India, vide letter no. 16/7/2017- M.VI part dated September 16, 2015.
22.	**Road Transport Related:** Project Proponent shall implement the following mitigation measures: (i) All the mine lease holders should follow the suggested ore transport mode (SOTM), based on its EC capacity within next 5 years. (ii) The mine lease holders should ensure construction of cement road of appropriate width from and to the entry and exit gate of the mine, as suggested in Chapter 10. Further, maintenance of all the roads should be carried out as per the requirement to ensure dust free road transport. (iii) Transportation of ore should be done by covering the trucks with tarpaulin or other suitable mechanism so that no spillage of ore/dust takesplace. Further, air quality in terms of dust, PM10 should be monitored near the roads towards entry & exit gate on	**Complied.** (i)SOTM 1 is 100% being followed as the entire dispatch of iron ore is through rail. (ii)Black top road has been constructed appropriate width from and to the entry and exit gate of the mine. (iii) Not applicable as the entire dispatch is through the rails only.

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	regular basis, and be maintained within the acceptable limits**.** **Responsibility:** Individual Mine Lease Holders and Department of Steel and Mines.	
23.	Occupational Health Related: Project Proponent shall implement the following mitigation measures (i) Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects periodically. (ii) Occupational health surveillance program for all the employees/workers (including casual workers) should be undertaken periodically (on annual basis) to observe any changes due to exposure to dust, and corrective measures should be taken immediately, if needed. (iii) Occupational health and safety measures related awareness programs including identification of work-related health hazard, training on malaria eradication, HIV and health effects on exposure to mineral dust etc., should be carried out for all the workers on regular basis. A full-time qualified doctor should be engaged for the purpose. Periodic monitoring (on 6 monthly basis) for exposure to respirable minerals dust on the workers should be conducted, and record should be maintained including health record of all the workers. Review of impact of various health measures undertaken (at an interval of 3 years or less) should be conducted followed by follow-up of actions, wherever required. Occupational health	**Being Complied With.** i)Adequate dust masks are provided to employees engaged in dusty areas. It is also ensured that they use the same. The employees are also given regular awareness training on safety and health aspects as part of implementation process of ISO-45001 systems. Further, employees undergo Lung Function Tests during the Periodical Medical Examination. ii)Periodical Medical Examination of employees and contractor workers are organized regularly to observe any contractions due to exposure to dust and other occupational hazards. (iii) Pre-placement medical examination and periodical examination of the workers engaged are being conducted & record maintained. The schedule of Periodical Medical Examination is once in every 3 years for the employees of age more than 40 years and once in 5 years for the employees of age less than 40 years. The concentration of Respirable dust at different locations is monitored. The employees are also given regular awareness training on safety and health aspects as part of implementation process of ISO- 45001systems.

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	centre should be established near mine site itself. Responsibility: Individual Mine Lease Holders and District Administration (District Medical Officer).	

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Annexure-A

EC compliance as per circular no. Z-11013/57/2014-IA.II(M) dated:29th Oct 2014

S.No.	Condition	Compliance Status
A	The Project Authority shall adopt Best filming Practice for the given mining conditions. In the mining area, adequate number of check dams, retaining walls/structures, garland drains and settling ponds should be provided to arrest the wash – off with rain water in catchment area.	Noted and is complied
B	The natural water bodies and or streams which are flowing in and around the village should not be disturbed. The Water Table should be nurtured so as not to go down below the pre-mining period. In case of any water scarcity in the area, the Project Authorities have to provide water to the villagers for their use. A provision for regular monitoring of water table in open dug well located in village should be incorporated to ascertain the impact of mining over ground water table.	Noted & is complied
C	The illumination and sound at night at project sites disturb the villages in respect of both human and animal population. Consequent sleeping disorders and stress may affect the health in the villages located close to mining operations. Habitations have a right to darkness and minimal noise levels at night. The Project Proponents (PPs) must ensure that the biological clock of the villagers is not disturbed by orienting the floodlights/ masks away from the noise levels well within the prescribed limit's for day/night hours.	Noted & is is complied
D	The Project Authority shall make necessary alternative arrangements, where required, in consultation with the State Government to provide alternate areas for livestock grazing. In this context, Project Authority should implement the directions of the Hon'ble Supreme Court with regard to acquiring grazing land. The sparse trees on such grazing ground, which provide mid- which provide mid – day shelter from the scorching sun should be scrupulously guarded against felling lest the cattle abandon the grazing ground or return home by noon.	Noted & is complied
E	Where ever blasting is undertaken as part of mining activity, the Project Authority shall carry out vibration studies well before approaching any such habitats or other buildings to evaluate the Zone of influence and impact of blasting on the neighbourhood. Within 500 meters of such sites vulnerable to blasting vibrations, avoidance of use of explosives and adoption of alternative means of mineral extraction, such as ripper/dozer combination/rock breakers/ surface miners etc. should be seriously considered and practiced wherever practicable. A provision for monitoring of each blast should be made so that the impact of blasting on nearly habitation and dwelling units could be ascertained, The covenant of lease deed under Rule 31 of MCR 1960 provides that no mining operations shall be carried out within 50 meters of public works such as public roads and buildings of inhabited sites except with in prior permission from the Competent Authority.	Noted & is complied
F	Main haulage road in the mine should be provided with permanent water sprinklers and other roads should be regularly wetted with water tankers fitted with sprinklers. Crusher and material transfer points should	Complied

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Annexure-A

EC compliance as per circular no. Z-11013/57/2014-IA.II(M) dated:29th Oct 2014

S.No.	Condition	Compliance Status
	invariably be provided with Bag filters and or dry logging system. Belt- conveyors should be fully covered to avoid air borne dust.	
G	The Project Authority shall ensure that the productivity of agricultural crops is not affected due to mining operations. Crop Liability Insurance Policy has to be taken by the PP as a precaution to compensate for any crop loss. The impact zone shall be 5km from the boundary of mine lease-area for such insurance policy. In case, several mines are located in a cluster, the Associations of owners of the cluster mines, formed inter-alia, to sub-serve such an objective, shall take responsibility for securing such drop Liability Policy.	Not Applicable
H	In case any village is located within the mining leasehold which is not likely to be affected due to mining activities during the life of mine, the Expert. Appraisal Committee (EAC) should consider the proposal of Environmental Clearance (EC) for reduced mining area. The Mining lease may be executed for the area for which EC is accorded. The mining plan may also be accordingly revised and required stipulations under the MMDR Act, 1957 rind MCR, 1960 met.	Not Applicable
I	Transportation of the minerals by road passing through the village shall not be allowed. A 'bypass' road should be constructed (say, leaving a gap of at least 200 meters) for the purpose of transportation of the minerals so that the impact of sound, dust and accidents could be mitigated. The PP shall bear the cost towards the widening and strengthening of existing public road network in case the same is proposed to be used for the Project. No road movement should be allowed on existing village road network without appropriately increasing the carrying capacity of such roads.	Not Applicable as our 100% minerals transportation is through rails only
J	Likewise, alteration or re-routing of foot paths, pagdandies, cart roads, and village infrastructure/public utilities or roads (for purposes of land acquisition for mining) shall be avoided to the extent possible rind in case such acquisition is inevitable, alternative arrangements shall be made first and then only the area acquired. In these types of cases, Inspection Reports by site visit by experts may be insisted upon which should be done through reputed Institutes.	Not Applicable
K	As CSR activities by Companies including the Mining Establishments has become mandatory up to 2% of their financial turn-over, Socio Economic Development. of the neighbourhood Habitats could also be planned and executed by the PPs more systematically based on the 'Need based door to door survey' by established Social Institutes/Workers on the lines as required under TOR. "R&R Plan/compensation details for the Project affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SC's /ST's and other weaker sections of the society in the study area, a need based sample survey, family wise, should be undertaken to assess their requirements, and	Noted & is complied

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Annexure-A

EC compliance as per circular no. Z-11013/57/2014-IA.II(M) dated:29th Oct 2014

S.No.	Condition	Compliance Status
	action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village located in the mine lease area will be shifted or not. The issues related to shifting of village including their R&R and socio-economic aspects should be discussed in the EIA Report."	

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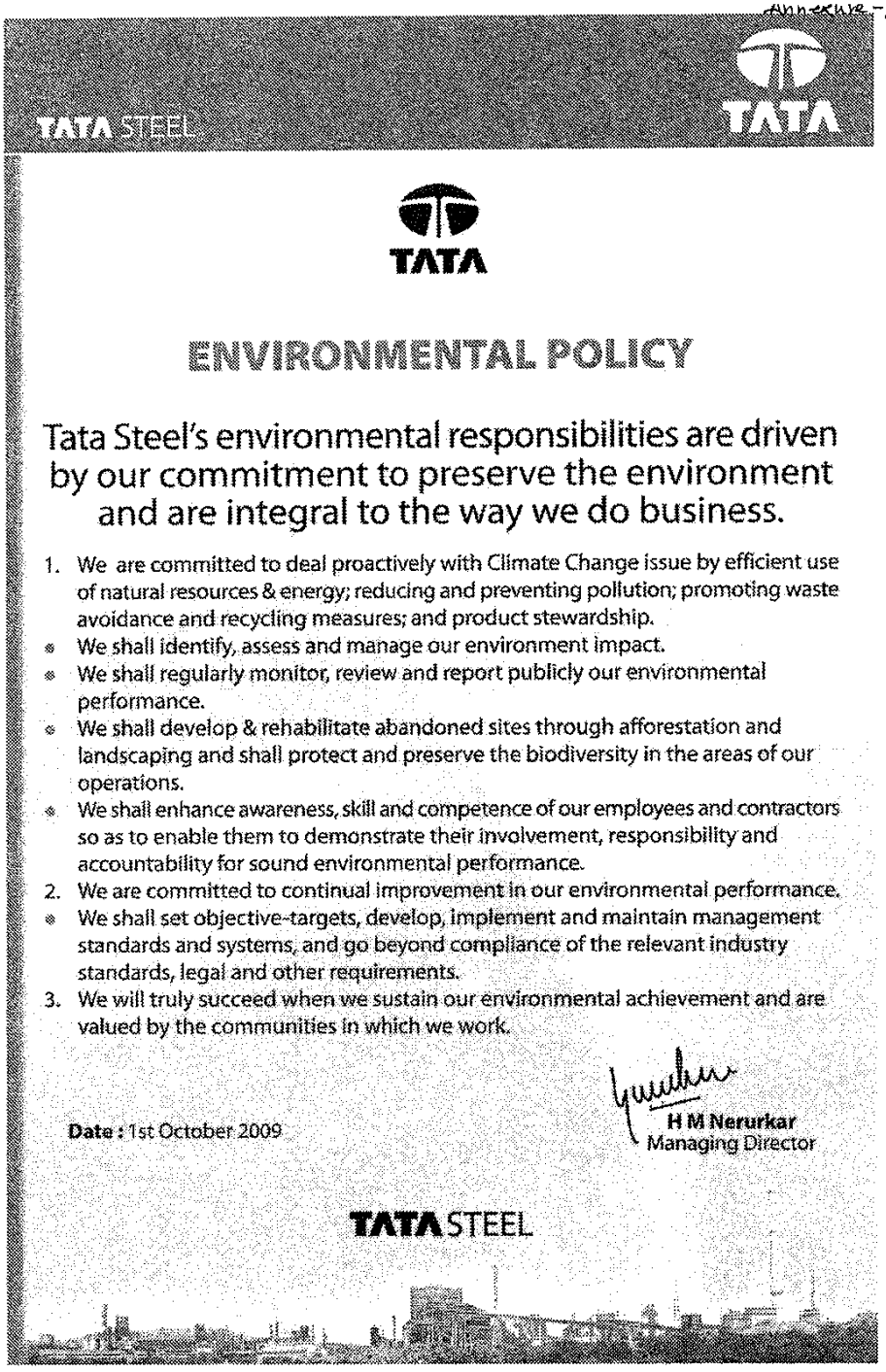
ANNEXURE-1



TATA STEEL

TATA

ENVIRONMENTAL POLICY

Tata Steel's environmental responsibilities are driven by our commitment to preserve the environment and are integral to the way we do business.

1. We are committed to deal proactively with Climate Change issue by efficient use of natural resources & energy; reducing and preventing pollution; promoting waste avoidance and recycling measures; and product stewardship.
   - We shall identify, assess and manage our environment impact.
   - We shall regularly monitor, review and report publicly our environmental performance.
   - We shall develop & rehabilitate abandoned sites through afforestation and landscaping and shall protect and preserve the biodiversity in the areas of our operations.
   - We shall enhance awareness, skill and competence of our employees and contractors so as to enable them to demonstrate their involvement, responsibility and accountability for sound environmental performance.
2. We are committed to continual improvement in our environmental performance.
   - We shall set objective-targets, develop, implement and maintain management standards and systems, and go beyond compliance of the relevant industry standards, legal and other requirements.
3. We will truly succeed when we sustain our environmental achievement and are valued by the communities in which we work.

Date : 1st October 2009

H M Nerurkar
Managing Director

TATA STEEL

Signature

Manager Environment
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TATA STEEL LTD

ANNEXURE – 2

Ground Water Level

Joda East Iron Mine

(October 2019 – March 2020)

Ground Water level details for Post–Monsoon (November) & Winter (February)

EC condition no. (xx), vide no. J-11015/215/2008-IA.II (M) dated 11th March, 2013.

(xx) Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and installing new piezometers during the mining operation. The periodic monitoring (at least four times in a year - pre-monsoon (April- May), monsoon (August), post – monsoon (November) and winter (January); once in each season) shall be carried out in consultation with the State Ground Water Board/Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment and Forests and its Regional Office Bhubaneswar, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the ground water table is getting depleted due to mining activity, necessary corrective measures shall be carried out.

Joda East Iron Mine of M/s Tata Steel Limited is an operational opencast captive iron mine. Regular monitoring of ground water level in and around the mine lease of existing well is regularly been done in desired frequency. The detailed quality report is attached herewith. The Joda East Iron Mine has received NOC from CGWA for ground water withdrawal of 460m^3/day recently vide no. CGWA/NOC/MIN/ORIG/2018/4245, dated 10th Oct 2018. As per recent hydro-geological study & regulatory approval, few additional locations are also incorporated along with proposed piezometers in the area. Monitored water level for of area for the month of November 2019 and February 2020 are as follows:

Sl. No.	LOCATION	MONTH	
		November 2019	February 2020
Existing Dug Well Locations:			
1.	Kamar Joda, Joda	02 m 85 cm	3m 98 cm
2.	Baneikala, Near NAC GATE	03 m 78 cm	4 m 61 cm
3.	Kamar Joda in Rugudi Sahi	08 m 15 cm	8 m 90 cm
4.	Ramjan Hutting, Joda	01 m 65 cm	1 m 85 cm
5.	Khuntpani, near School, Joda	01 m 79 cm	2 m 80 cm
Newly Constructed Piezometer Locations			
6	Chief Office, Joda East Iron Mine	16 m 92 cm	17 m 84 cm
7	RC Gate, Joda East Iron Mine	12 m 29cm	13 m 15 cm
8	Near Manmora Dump, Joda East Iron Mine	10 m 25 cm	11m
9	Near Rainwater Harvesting Pond, Joda East Iron Mine	01 m 21 cm	1 m 32 cm
10	RMP Office, Joda	02 m 56 cm	3 m 28 cm

Signature

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Photographs of Piezometer installed at various locations
at
Joda East Iron Mine, TATA Steel Ltd.

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Rain Water Harvesting Structure Developed

Joda East Iron Mine, Tata Steel Ltd

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Ground water Quality

(October'19 – March'20)

Joda East Iron Mine

Visiontek Consultancy Services Pvt. Ltd.

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(ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified)

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Certificate No.: TC-7944

Format No.: 7.8.2/FMT/TR/06

TEST REPORT

(GROUND WATER QUALITY ANALYSIS REPORT- NOV-2019)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab/19/R6238	**Report Release Date**	03.12.19
Sample Code	GW-1-GW-2	**Sampled By**	VCSPL Representative
Sample Name	Ground Water	**Sampled On**	12.11.2019
Sample Condition	Sealed & Ice Preserved	**Sampling Location**	**GW-1**: Khuntpani **GW-2**: Baneikala
Test Started On	13.11.2019	**Sample Received On**	13.11.2019
		Test Completed On	20.11.2019

Sl. No	Parameter	Testing Methods	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018		Analysis Results	
				Acceptable Limit	Permissible Limit	GW-1	GW-2
Essential Characteristics							
1	*Colour	APHA23rd Edn,2017: 2120 B, C	Hazen	5	15	CL	CL
2	*Odour	APHA23rd Edn,2017: 2150 B	--	Agreeable	Agreeable	Agreeable	Agreeable
3	*Taste	APHA23rd Edn,2017: 2160 C	--	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	APHA23rd Edn,2017: 2130 B	NTU	1	5	<1	<1
5	pH Value	APHA23rd Edn,2017: 4500H+ B	--	6.5-8.5	No relaxation	7.36	7.42
6	TotalHardness(as $CaCO_3$)	APHA23rd Edn,2017: 2340 C	mg/l	200	600	121.0	148.0
7	Iron (as Fe)	APHA23rd Edn,2017: 3111 B	mg/l	1.0	No relaxation	0.22	0.28
8	Chloride (as Cl)	APHA23rd Edn,2017: 4500Cl- B	mg/l	250	1000	30.8	32.6
9	*Residual, free Chlorine	APHA23rd Edn,2017:4500Cl, B	mg/l	0.2	1	ND	ND
Desirable Characteristics							
10	Dissolved Solids	APHA23rd Edn,2017: 2540 C	mg/l	500	2000	182.0	210.0
11	Calcium (as Ca)	APHA23rd Edn,2017: 3500Ca B	mg/l	75	200	30.2	32.8
12	Magnesium (as Mg)	APHA23rd Edn,2017: 3500Mg B	mg/l	30	100	12.4	13.8
13	Copper (as Cu)	APHA23rd Edn,2017: 3111 Cu B	mg/l	0.05	1.5	<0.02	<0.02
14	Manganese (as Mn)	APHA23rd Edn,2017: 3111 B	mg/l	0.1	0.3	0.011	0.012
15	*Sulphate (as SO_4)	APHA23rd Edn,2017: 4500 SO_4^{2-} E	mg/l	200	400	4.1	4.6
16	*Nitrate (as NO_3)	APHA23rd Edn,2017:4500 NO_3^- E	mg/l	45	No relaxation	2.1	2.8
17	*Fluoride (as F)	APHA23rd Edn,2017: 4500F- C	mg/l	1	1.5	0.014	0.021
18	*Phenolic Compounds (as C_6H_5OH)	APHA23rd Edn,2017: 5530 B,D	mg/l	0.001	0.002	<0.001	<0.001
19	Mercury (as Hg)	APHA23rd Edn,2017:3112 B	mg/l	0.001	No relaxation	<0.001	<0.001
20	Cadmium (as Cd)	APHA23rd Edn,2017: 3111 B	mg/l	0.003	No relaxation	<0.001	<0.001
21	*Selenium (as Se)	APHA23rd Edn,2017: 3114 B	mg/l	0.01	No relaxation	<0.001	<0.001
22	*Arsenic (as As)	APHA23rd Edn,2017: 3114 B	mg/l	0.01	No relaxation	<0.004	<0.004
23	*Cyanide (as CN)	APHA23rd Edn,2017: 4500 CN- C,D	mg/l	0.05	No relaxation	ND	ND
24	Lead (as Pb)	APHA23rd Edn,2017:3111 B	mg/l	0.01	No relaxation	<0.01	<0.01
25	Zinc (as Zn)	APHA23rd Edn,2017: 3111 B	mg/l	5	15	<0.01	<0.01
26	*Anionic Detergents (as MBAS)	APHA23rd Edn,2017: 5540 C	mg/l	0.2	1	<0.2	<0.2
27	*Chromium (as Cr^{+6})	APHA23rd Edn,2017: 3500Cr B	mg/l	--	--	<0.01	<0.01
28	*Mineral Oil	APHA23rd Edn,2017: 5220 B	mg/l	0.5	No relaxation	<0.1	<0.1
29	Alkalinity	APHA23rd Edn,2017: 2320 B	mg/l	200	600	101.2	114.0
30	*Aluminium as(Al)	APHA23rd Edn,2017: 3500Al B	mg/l	0.03	0.2	<0.01	<0.01
31	*Boron (as B)	APHA23rd Edn,2017: 4500B, B	mg/l	0.05	2.4	<0.1	<0.1
32	*Poly Aromatic Hydrocarbon as PAH	APHA23rd Edn,2017: 6440 B	mg/l	0.0001	No relaxation	<0.001	<0.001
33	*Pesticide	APHA23rd Edn,2017: 6630 B,C	µg/l	--	No relaxation	Absent	Absent
34	*EColi	APHA23rd Edn,2017: 9221 F	MPN/ 100ml	Shall not be detectable in any 100ml sample	--	<1.1	<1.1

*Note Above (*) parameters are not in our NABLscope. **Note: CL: Colorless, ND: Not Detected.***

BDL (Below Detectable Limits) Values: Cu<0.025 mg/l, Mn<0.05 mg/l, C6H5OH<0.001 mg/l, Hg<0.001 mg/l, Cd<0.001 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.05 mg/l, Cr+6<0.01mg/l, Al<0.01 mg/l, B<0.01 mg/l,. PAH<0.0001 mg/l

1. The test values are reported based on the samples received. 2. Samples will be destroyed after 7 days from date of issues of the test report subject to nature of preservation. Sample will be preserved as per standard method.

3. The test report shall not be reproduced, without written approval of laboratory

Authorized Signatory

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TEST REPORT

(GROUND WATER QUALITY ANALYSIS REPORT- NOV-2019)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab/19/R-6239	**Report Release Date**	03.12.19
Sample Code	GW-3-GW-4	**Sampled By**	VCSPL Representative
Sample Name	Ground Water	**Sampled On**	12.11.2019
Sample Condition	Sealed & Ice Preserved	**Sampling Location**	**GW-3**: Baneikala **GW-4**: Kamar Joda
Test Started On	13.11.2019	**Sample Received On**	13.11.2019
		Test Completed On	20.11.2019

Sl. No	Parameter	Testing Methods	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018		Analysis Results	
				Acceptable Limit	Permissible Limit	GW-3	GW-4
Essential Characteristics							
1	*Colour	APHA23rd Edn,2017: 2120 B, C	Hazen	5	15	CL	CL
2	*Odour	APHA23rd Edn,2017: 2150 B	--	Agreeable	Agreeable	Agreeable	Agreeable
3	*Taste	APHA23rd Edn,2017: 2160 C	--	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	APHA23rd Edn,2017: 2130 B	NTU	1	5	<1	<1
5	pH Value	APHA23rd Edn,2017: 4500H+ B	--	6.5-8.5	No relaxation	7.38	7.41
6	TotalHardness(as $CaCO_3$)	APHA23rd Edn,2017: 2340 C	mg/l	200	600	142.0	151.0
7	Iron (as Fe)	APHA23rd Edn,2017: 3111 B	mg/l	1.0	No relaxation	0.26	0.24
8	Chloride (as Cl)	APHA23rd Edn,2017: 4500Cl- B	mg/l	250	1000	32.2	34.8
9	*Residual, free Chlorine	APHA23rd Edn,2017:4500Cl, B	mg/l	0.2	1	ND	ND
Desirable Characteristics							
10	Dissolved Solids	APHA23rd Edn,2017: 2540 C	mg/l	500	2000	216.0	222.0
11	Calcium (as Ca)	APHA23rd Edn,2017: 3500Ca B	mg/l	75	200	40.2	42.8
12	Magnesium (as Mg)	APHA23rd Edn,2017: 3500Mg B	mg/l	30	100	15.2	16.1
13	Copper (as Cu)	APHA23rd Edn,2017: 3111 Cu B	mg/l	0.05	1.5	<0.02	<0.02
14	Manganese (as Mn)	APHA23rd Edn,2017: 3111 B	mg/l	0.1	0.3	0.01	0.016
15	*Sulphate (as SO_4)	APHA23rd Edn,2017: 4500 SO_4^{2-} E	mg/l	200	400	5.2	6.1
16	*Nitrate (as NO_3)	APHA23rd Edn,2017:4500 NO_3^- E	mg/l	45	No relaxation	3.1	2.8
17	*Fluoride (as F)	APHA23rd Edn,2017: 4500F- C	mg/l	1	1.5	0.022	0.021
18	*Phenolic Compounds (as C_6H_5OH)	APHA23rd Edn,2017: 5530 B,D	mg/l	0.001	0.002	<0.001	<0.001
19	Mercury (as Hg)	APHA23rd Edn,2017:3112 B	mg/l	0.001	No relaxation	<0.001	<0.001
20	Cadmium (as Cd)	APHA23rd Edn,2017: 3111 B	mg/l	0.003	No relaxation	<0.001	<0.001
21	*Selenium (as Se)	APHA23rd Edn,2017: 3114 B	mg/l	0.01	No relaxation	<0.001	<0.001
22	*Arsenic (as As)	APHA23rd Edn,2017: 3114 B	mg/l	0.01	No relaxation	<0.004	<0.004
23	*Cyanide (as CN)	APHA23rd Edn,2017: 4500 CN- C,D	mg/l	0.05	No relaxation	ND	ND
24	Lead (as Pb)	APHA23rd Edn,2017:3111 B	mg/l	0.01	No relaxation	<0.01	<0.01
25	Zinc (as Zn)	APHA23rd Edn,2017: 3111 B	mg/l	5	15	<0.01	<0.01
26	*Anionic Detergents (as MBAS)	APHA23rd Edn,2017: 5540 C	mg/l	0.2	1	<0.2	<0.2
27	*Chromium (as Cr^{+6})	APHA23rd Edn,2017: 3500Cr B	mg/l	--	--	<0.01	<0.01
28	*Mineral Oil	APHA23rd Edn,2017: 5220 B	mg/l	0.5	No relaxation	<0.1	<0.1
29	Alkalinity	APHA23rd Edn,2017: 2320 B	mg/l	200	600	121.0	126.0
30	*Aluminium as(Al)	APHA23rd Edn,2017: 3500Al B	mg/l	0.03	0.2	<0.01	<0.01
31	*Boron (as B)	APHA23rd Edn,2017: 4500B, B	mg/l	0.05	2.4	<0.1	<0.1
32	*Poly Aromatic Hydrocarbon as PAH	APHA23rd Edn,2017: 6440 B	mg/l	0.0001	No relaxation	<0.001	<0.001
33	*Pesticide	APHA23rd Edn,2017: 6630 B,C	µg/l	--	No relaxation	Absent	Absent
34	*EColi	APHA23rd Edn,2017: 9221 F	MPN/ 100ml	Shall not be detectable in any 100ml sample	--	<1.1	<1.1

Note Above (*) parameters are not in our NABL scope. ***Note: CL: Colorless, ND: Not Detected.***

3DL (Below Detectable Limits) Values: Cu<0.025 mg/l, Mn<0.05 mg/l, C6H5OH<0.001 mg/l, Hg<0.001 mg/l, Cd<0.001 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.05 mg/l, Cr^{+6}<0.01mg/l, Al<0.01 mg/l, B<0.01 mg/l,. PAH<0.0001 mg/l

1. The test values are reported based on the samples received. 2. Samples will be destroyed after 7 days from date of issues of the test report subject to nature of preservation. Sample will be preserved as per standard method.
3. The test report shall not be reproduced, without written approval of laboratory

VISIONTEK CONSULTANCY SERVICES PVT. LTD.

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TEST REPORT

(GROUND WATER QUALITY ANALYSIS REPORT- FEBRUARY-2020)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab 1191R-8269	**Report Release Date**	02.03.20
Sample Code	GW1-GW2	**Sampled By**	VCSPL Representative
Sample Name	Ground Water	**Sampled On**	04.02.2020
Sample Condition	Ice Preserved	**Sampling Location**	GW-1: Khuntpani GW-2: Bancikala
Test Started On	05.02.2020	**Sample Received On**	05.02.2020
		Test Completed On	11.02.2020

Sl. No	Parameter	Testing Methods	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018		Analysis Results	
				Acceptable Limit	Permissible Limit	GW-1	GW-2
Essential Characteristics							
1	*Colour	APHA23rd Edn,2017: 2120 B, C	Hazen	5	15	CL	CL
2	*Odour	APHA23rd Edn,2017: 2150 B	--	Agreeable	Agreeable	Agreeable	Agreeable
3	*Taste	APHA23rd Edn,2017: 2160 C	--	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	APHA23rd Edn,2017: 2130 B	NTU	1	5	<0.2	<0.2
5	pH Value	APHA23rd Edn,2017: 4500H+ B	--	6.5-8.5	No relaxation	7.24	7.26
6	TotalHardness(as $CaCO_3$)	APHA23rd Edn,2017: 2340 C	mg/l	200	600	130.0	144.0
7	Iron (as Fe)	APHA23rd Edn,2017: 3111 B	mg/l	1.0	No relaxation	0.22	0.21
8	Chloride (as Cl)	APHA23rd Edn,2017: 4500Cl- B	mg/l	250	1000	24.6	30.2
9	*Residual, free Chlorine	APHA23rd Edn,2017:4500Cl, B	mg/l	0.2	1	ND	ND
Desirable Characteristics							
10	Dissolved Solids	APHA23rd Edn,2017: 2540 C	mg/l	500	2000	206.0	224.0
11	Calcium (as Ca)	APHA23rd Edn,2017: 3500Ca B	mg/l	75	200	36.0	38.0
12	Magnesium (as Mg)	APHA23rd Edn,2017: 3500Mg B	mg/l	30	100	8.0	10.2
13	Copper (as Cu)	APHA23rd Edn,2017: 3111 Cu B	mg/l	0.05	1.5	<0.05	<0.05
14	Manganese (as Mn)	APHA23rd Edn,2017: 3111 B	mg/l	0.1	0.3	0.016	0.012
15	*Sulphate (as SO_4)	APHA23rd Edn,2017: 4500 SO_4^{2-} E	mg/l	200	400	5.2	5.6
16	*Nitrate (as NO_3)	APHA23rd Edn,2017:4500 NO_3^- E	mg/l	45	No relaxation	2.8	3.2
17	*Fluoride (as F)	APHA23rd Edn,2017: 4500F- C	mg/l	1	1.5	0.024	0.032
18	*Phenolic Compounds (as C_6H_5OH)	APHA23rd Edn,2017: 5530 B,D	mg/l	0.001	0.002	<0.001	<0.001
19	Mercury (as Hg)	APHA23rd Edn,2017:3112 B	mg/l	0.001	No relaxation	<0.001	<0.001
20	Cadmium (as Cd)	APHA23rd Edn,2017: 3111 B	mg/l	0.003	No relaxation	<0.001	<0.001
21	*Selenium (as Se)	APHA23rd Edn,2017: 3114 B	mg/l	0.01	No relaxation	<0.001	<0.001
22	*Arsenic (as As)	APHA23rd Edn,2017: 3114 B	mg/l	0.01	No relaxation	<0.001	<0.001
23	*Cyanide (as CN)	APHA23rd Edn,2017: 4500 CN- C,D	mg/l	0.05	No relaxation	ND	ND
24	Lead (as Pb)	APHA23rd Edn,2017:3111 B	mg/l	0.01	No relaxation	<0.001	<0.001
25	Zinc (as Zn)	APHA23rd Edn,2017: 3111 B	mg/l	5	15	<0.05	<0.05
26	*Anionic Detergents (as MBAS)	APHA23rd Edn,2017: 5540 C	mg/l	0.2	1	<0.2	<0.2
27	*Chromium (as Cr^{+6})	APHA23rd Edn,2017: 3500Cr B	mg/l	--	--	<0.05	<0.05
28	*Mineral Oil	APHA23rd Edn,2017: 5220 B	mg/l	0.5	No relaxation	<0.01	<0.01
29	Alkalinity	APHA23rd Edn,2017: 2320 B	mg/l	200	600	121.0	124.0
30	*Aluminium as(Al)	APHA23rd Edn,2017: 3500Al B	mg/l	0.03	0.2	<0.001	<0.001
31	*Boron (as B)	APHA23rd Edn,2017: 4500B, B	mg/l	0.05	2.4	<0.01	<0.01
32	*Poly Aromatic Hydrocarbon as PAH	APHA23rd Edn,2017: 6440 B	mg/l	0.0001	No relaxation	<0.001	<0.001
33	*Pesticide	APHA23rd Edn,2017: 6630 B,C	µg/l	--	No relaxation	Absent	Absent
34	*EColi	APHA23rd Edn,2017: 9221 F	MPN/ 100ml	Shall not be detectable in any 100ml sample	--	<1.1	<1.1

Note Above (*) parameters are not in our scope. Note: CL: Colorless, ND: Not Detected.
'DL (Below Detectable Limits) Values: Cu=0.02 mg/l, Mn=0.05 mg/l, C6H5OH=0.05 mg/l, Hg=0.004 mg/l, Cd=0.01 mg/l, Se=0.001 mg/l, As=0.004 mg/l, CN=0.01 mg/l Pb=0.01 mg/l, Zn=0.05 mg/l, Cr^{+6}=0.01 mg/l, Al=0.01 mg/l, B=0.1 mg/L, PAH=0.0001 mg/l,EC<1.1MPN/100ML

1. The test values are reported based on the samples received. 2. Samples will be destroyed after 7 days from date of issues of the test report subject to nature of preservation. Sample will be preserved as per standard method.

Authorized Signatory

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Ground water Quality

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Certificate No.: TC-7944
Format No.: 7.8.2/FMT/TR/06

TEST REPORT

(GROUND WATER QUALITY ANALYSIS REPORT- FEBRUARY-2020)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab1101R-8270	Report Release Date	02.03.20
Sample Code	GW3 –GW4	Sampled By	VCSPL Representative
Sample Name	Ground Water	Sampled On	04.02.2020
Sample Condition	Ice Preserved	Sampling Location	GW-3: Kumarjoda GW-4: Banspani
Test Started On	05.02.2020	Sample Received On	05.02.2020
		Test Completed On	11.02.2020

Sl. No	Parameter	Testing Methods	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018		Analysis Results	
				Acceptable Limit	Permissible Limit	GW-3	GW-4
Essential Characteristics							
1	*Colour	APHA23rd Edn.2017: 2120 B, C	Hazen	5	15	CL	CL
2	*Odour	APHA23rd Edn.2017: 2150 B	--	Agreeable	Agreeable	Agreeable	Agreeable
3	*Taste	APHA23rd Edn.2017: 2160 C	--	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	APHA23rd Edn.2017: 2130 B	NTU	1	5	<0.2	<0.2
5	pH Value	APHA23rd Edn.2017: 4500H+ B	--	6.5-8.5	No relaxation	7.31	7.28
6	TotalHardness(as $CaCO_3$)	APHA23rd Edn.2017: 2340 C	mg/l	200	600	136.0	138.0
7	Iron (as Fe)	APHA23rd Edn.2017: 3111 B	mg/l	1.0	No relaxation	0.24	0.26
8	Chloride (as Cl)	APHA23rd Edn.2017: 4500Cl- B	mg/l	250	1000	34.0	38.0
9	*Residual, free Chlorine	APHA23rd Edn.2017:4500Cl, B	mg/l	0.2	1	ND	ND
Desirable Characteristics							
10	Dissolved Solids	APHA23rd Edn.2017: 2540 C	mg/l	500	2000	242.0	248.0
11	Calcium (as Ca)	APHA23rd Edn.2017: 3500Ca B	mg/l	75	200	32.0	34.0
12	Magnesium (as Mg)	APHA23rd Edn.2017: 3500Mg B	mg/l	30	100	11.2	11.8
13	Copper (as Cu)	APHA23rd Edn.2017: 3111 Cu B	mg/l	0.05	1.5	<0.05	<0.05
14	Manganese (as Mn)	APHA23rd Edn.2017: 3111 B	mg/l	0.1	0.3	0.011	0.014*
15	*Sulphate (as SO_4)	APHA23rd Edn.2017: 4500 SO_4^{2-} E	mg/l	200	400	6.2	6.8
16	*Nitrate (as NO_3)	APHA23rd Edn.2017:4500 NO_3^- E	mg/l	45	No relaxation	3.6	4.1
17	*Fluoride (as F)	APHA23rd Edn.2017: 4500F- C	mg/l	1	1.5	0.026	0.034
18	*Phenolic Compounds (as C_6H_5OH)	APHA23rd Edn.2017: 5530 B,D	mg/l	0.001	0.002	<0.001	<0.001
19	Mercury (as Hg)	APHA23rd Edn.2017:3112 B	mg/l	0.001	No relaxation	<0.001	<0.001
20	Cadmium (as Cd)	APHA23rd Edn.2017: 3111 B	mg/l	0.003	No relaxation	<0.001	<0.001
21	*Selenium (as Se)	APHA23rd Edn.2017: 3114 B	mg/l	0.01	No relaxation	<0.001	<0.001
22	*Arsenic (as As)	APHA23rd Edn.2017: 3114 B	mg/l	0.01	No relaxation	<0.001	<0.001
23	*Cyanide (as CN)	APHA23rd Edn.2017: 4500 CN- C,D	mg/l	0.05	No relaxation	ND	ND
24	Lead (as Pb)	APHA23rd Edn.2017:3111 B	mg/l	0.01	No relaxation	<0.001	<0.001
25	Zinc (as Zn)	APHA23rd Edn.2017: 3111 B	mg/l	5	15	<0.05	<0.05
26	*Amonic Detergents (as MBAS)	APHA23rd Edn.2017: 5540 C	mg/l	0.2	1	<0.2	<0.2
27	*Chromium (as Cr^{+6})	APHA23rd Edn.2017: 3500Cr B	mg/l	--	--	<0.05	<0.05
28	*Mineral Oil	APHA23rd Edn.2017: 5220 B	mg/l	0.5	No relaxation	<0.01	<0.01
29	Alkalinity	APHA23rd Edn.2017: 2320 B	mg/l	200	600	132.0	138.0
30	*Aluminium as(Al)	APHA23rd Edn.2017: 3500Al B	mg/l	0.03	0.2	<0.001	<0.001
31	*Boron (as B)	APHA23rd Edn.2017: 4500B, B	mg/l	0.05	2.4	<0.01	<0.01
32	*Poly Aromatic Hydrocarbon as PAH	APHA23rd Edn.2017: 6440 B	mg/l	0.0001	No relaxation	<0.001	<0.001
33	*Pesticide	APHA23rd Edn.2017: 6630 B,C	µg/l	--	No relaxation	Absent	Absent
34	*EColi	APHA23rd Edn.2017: 9221 F	MPN/ 100ml	Shall not be detectable in any 100ml sample	--	<1.1	<1.1

Note Above (*) parameters are not in our scope. ***Note: CL: Colorless, ND: Not Detected.***

MDL (Below Detectable Limits) Values: Cu=0.02 mg/l, Mn= 0.05 mg/l, C6H5OH=0.05 mg/l, Hg=0.004 mg/l, Cd<0.01 mg/l, Se=0.001 mg/l, As=0.004 mg/l, CN=0.01 mg/l Pb=0.01 mg/l, Zn=0.03 mg/l, Cr^{+6}<0.01 mg/l, Al=0.01 mg/l, B<0.1 mg/l,. PAH=0.0001 mg/l,EC=1 MPN/100Ml.

1. The test values are reported based on the samples received. 2. Samples will be destroyed after 7 days from date of issue of the test report subject to nature of preservation. Sample will be preserved as per standard method.

Authorized Signatory

No.-M-22&23, Chandaka Industrial Estate, Patia, Bhubaneswar-751024, Dist-Khurda, Odisha , Contact No.: 7752017905
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ANNEXURE- 3

Mineralogical Composition

Joda East Iron Mine

(Oct'2019 – March'2020)

Month	Silica (%)	FeO (%)	CaO (%)	Al_2O_3 (%)
Oct-19	0.54	0.42	0.032	<0.01
Nov-19	0.58	0.46	0.038	<0.01
Dec-19	0.62	0.48	0.034	<0.01
Jan- 20	0.61	0.42	0.032	<0.01
Feb-20	0.68	0.48	0.044	<0.01
Mar-20	0.74	0.52	0.046	<0.01

Lab in Charge

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Mineralogical Composition Analysis Report

(October 2019 – March 2020)

Joda East Iron Mine

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TEST REPORT

(MINEROLOGICAL COMPOSITION REPORT- OCTOBER-2019)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab/191/R-5221	**Report Release Date**	04.11.19
Sample Code	A-1	**Sampled By**	VCSPL Representative
Sample Name	Mineralogical Composition	**Sampled On**	07.10.2019
Sample Condition	Sealed	**Sampling Location**	A-1: Near Mines Area
Test Started On	08.10.2019	**Sample Received On**	08.10.2019
		Test Completed On	10.10.2019

Monitoring Date	Parameters	Analysis Results
		A-1
07.10.2019	*Silica(%)	0.54
	*FeO (%)	0.42
	*CaO (%)	0.032
	*Al_2O_3(%)	<0.01
	*P_2O_5(%)	<0.01

Note Above (*) parameters are not in our scope.

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3. The test report shall not be reproduced, without written approval of laboratory.

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TEST REPORT
(MINEROLOGICAL COMPOSITION REPORT- NOVEMBER-2019)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab/19/R-6073	Report Release Date	03.12.19
Sample Code	A-1	Sampled By	VCSPL Representative
Sample Name	Mineralogical Composition	Sampled On	30.11.2019
Sample Condition	Sealed	Sampling Location	A-1: Near Mines Area
Test Started On	01.12.2019	Sample Received On	01.12.2019
		Test Completed On	05.12.2019

Monitoring Date	Parameters	Analysis Results
		A-1
30.11.2019	*Silica(%)	0.58
	*FeO (%)	0.46
	*CaO (%)	0.038
	*Al_2O_3(%)	<0.01
	*P_2O_5(%)	<0.01

Note Above (*) parameters are not in our scope.

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Envlab1191R - 6855 03.01.2020

TEST REPORT
(MINEROLOGICAL COMPOSITION REPORT- DECEMBER-2019)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab1191R- 6855	**Report Release Date**	03.01.2020
Sample Code	A-1	**Sampled By**	VCSPL Representative
Sample Name	Mineralogical Composition	**Sampled On**	16.12.2019
Sample Condition	Sealed	**Sampling Location**	A-1: Near Mines Area
Test Started On	17.12.2019	**Sample Received On**	17.12.2019
		Test Completed On	21.12.2019

Monitoring Date	Parameters	Analysis Results
		A-1
16.12.2019	*Silica(%)	0.62
	*FeO (%)	0.48
	*CaO (%)	0.034
	*Al_2O_3(%)	<0.01
	*P_2O_5(%)	<0.01

Note Above (*) parameters are not in our scope.

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3. The test report shall not be reproduced, without written approval of laboratory.

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TEST REPORT
(MINEROLOGICAL COMPOSITION REPORT- JANUARY 2020)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Enplab/19/R-7491	**Report Release Date**	01/02/2020
Sample Code	A-1	**Sampled By**	VCSPL Representative
Sample Name	Mineralogical Composition	**Sampled On**	12.01.2020
Sample Condition	Sealed	**Sampling Location**	**A-1**: Near Mines Area
Test Started On	13.01.2020	**Sample Received On**	13.01.2020
		Test Completed On	18.01.2020

Monitoring Date	Parameters	Analysis Results
		A-1
12.01.2020	*Silica(%)	0.61
	*FeO (%)	0.42
	*CaO (%)	0.032
	*Al_2O_3(%)	<0.01
	*P_2O_5(%)	<0.01

Note Above (*) parameters are not in our scope.

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TEST REPORT
(MINEROLOGICAL COMPOSITION REPORT- FEBRUARY 2020)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab/1918-8256	Report Release Date	02.03.20
Sample Code	A-1	Sampled By	VCSPL Representative
Sample Name	Mineralogical Composition	Sampled On	06.02.2020
Sample Condition	Sealed	Sampling Location	A-1: Near Mines Area
Test Started On	07.02.2020	Sample Received On	07.02.2020
		Test Completed On	11.02.2020

Monitoring Date	Parameters	Analysis Results
		A-1
06.02.2020	*Silica(%)	0.68
	*FeO (%)	0.48
	*CaO (%)	0.044
	*Al_2O_3(%)	<0.01
	*P_2O_5(%)	<0.01

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TEST REPORT
(MINEROLOGICAL COMPOSITION REPORT- MARCH- 2020)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	ENVLAB/19/R-9217	**Report Release Date**	03.04.2020
Sample Code	A-1	**Sampled By**	VCSPL Representative
Sample Name	Mineralogical Composition	**Sampled On**	05.03.2020
Sample Condition	Sealed	**Sampling Location**	A-1: Near Mines Area
Test Started On	07.03.2020	**Sample Received On**	07.03.2020
		Test Completed On	09.03.2020

Monitoring Date	Parameters	Analysis Results
		A-1
05.03.2020	*Silica(%)	0.74
	*FeO (%)	0.52
	*CaO (%)	0.046
	*Al_2O_3(%)	<0.01
	*P_2O_5(%)	<0.01

Note Above (*) parameters are not in our scope.

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ANNEXURE-4

Zero Discharge Slime Dam & Water Recovery System

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ANNEXURE-5

Dust suppression system

Use of fixed water sprinklers at haul roads for dust suppression

Use of water Mist Canon for dust suppression

Use of Dry fog system at all transfer points in plants

Use of mobile tankers for water sprinkling on haul roads

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ANNEXURE-6

Average Air Quality Report (Core Zone)

JODA EAST IRON MINE

AVERAGE AIR QUALITY REPORT (CORE ZONE)

Month	Manmora Slime Dam					Near Rain Water Harvesting					Near Magazine					Near Equipment Maintenance				
	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO
Oct 19	54.45	32.67	6.41	10.10	0.26	56.05	33.63	8.19	10.25	0.32	58.58	35.15	9.10	12.45	0.28	58.40	33.49	8.91	14.12	0.39
Nov 19	57.15	34.29	7.71	11.55	0.33	59.51	35.71	8.56	12.13	0.30	64.10	38.46	9.71	12.44	0.24	59.38	32.75	8.04	14.94	0.45
Dec 19	63.87	38.44	7.51	11.33	0.31	56.93	34.06	8.13	10.70	0.31	54.62	33.02	9.14	13.05	0.27	62.60	33.73	6.57	12.66	0.44
Jan 20	70.59	41.92	9.02	12.86	0.32	71.54	41.86	8.56	12.54	0.26	58.36	35.15	9.49	12.46	0.24	62.27	33.70	7.18	13.01	0.45
Feb 20	84.78	50.87	9.83	17.08	0.45	86.25	51.75	10.6	18.28	0.27	76.83	46.10	9.64	13.59	0.34	82.83	34.73	8.26	13.98	0.40
Mar 20	82.23	49.34	10.87	17.29	0.51	80.57	48.34	11.1	18.29	0.33	76.49	45.89	9.41	13.51	0.34	82.57	32.44	8.26	14.00	0.41

AVERAGE AIR QUALITY REPORT (BUFFER ZONE)

Month	Baneikela					Lohanda					Khuntpani					Joda Colony (VTC)				
	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO
Oct 19	43.20	25.92	5.50	10.80	0.19	42.70	25.62	6.55	11.7	0.24	47.20	28.32	6.85	12.80	0.22	49.70	29.82	<4.0	11.60	0.28
Nov 19	51.90	31.14	5.90	10.90	0.20	45.20	27.12	7.00	12.1	0.28	52.50	31.50	7.10	12.90	0.25	50.80	30.48	<4.0	12.10	0.34
Dec 19	48.70	29.22	6.35	11.50	0.26	48.50	29.10	7.35	13.4	0.29	52.00	31.20	7.85	13.80	0.30	53.00	31.80	<4.0	12.20	0.32
Jan 20	48.20	28.92	6.70	12.00	0.30	51.70	32.20	7.00	13.7	0.33	54.70	32.82	8.35	14.50	0.29	56.80	34.08	<4.0	14.20	0.37
Feb 20	54.70	32.82	7.20	13.20	0.34	62.00	37.20	7.90	14.0	0.39	67.30	40.38	9.00	15.80	0.32	68.40	41.04	<4.0	15.60	0.43
Mar 20	57.40	34.44	7.60	13.90	0.40	64.40	38.64	8.20	14.5	0.44	70.90	42.54	9.70	16.00	0.36	65.50	39.30	<4.0	14.80	0.39

Unit of measurement for all parameters except CO is µg/m³, Co is in mg/m³

Lab-in-charge

Signature

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ANNEXURE-7

Plantation on OB dump

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Plantation Details with Species

In FY-20 a Total of **8260 Saplings** were Planted inside JEIM Lease. Species Wise Breakup is given below Table:

Sl No.	Species Common Name	Botanical Name	No. of Saplings Planted
1	**Karanj**	*Pongamia pinnata*	2430
2	**Gamhar**	*Gmelina arborea*	810
3	**Sisham**	*Dalbergia sissoo*	1120
4	**Arjun**	*Terminalia Arjuna*	140
5	**Karam**	*NaucleaParvifolia*	140
6	**Simal**	*Bombax ceiba*	510
7	**Sunari**	*Cassia fistula L.*	150
8	**Kulchi**	*Holarrhena antidysenterica*	235
9	**Shall**	*Shorea Robusta*	90
10	**Mahul**	*Madhuca longifolia*	215
11	**Bahara**	*Terminalia bellirica*	335
12	**Amara**	*Phyllanthus emblica*	275
13	**Ber**	*Ziziphus mauritiana*	120
14	**Bel**	*Aegle marmelos*	30
15	**Jamun**	*Syzygium cumini*	445
16	**Lava**		40
17	**Kachanar**	*Bauhinia variegata*	50
18	**Sirish**	*Albizia lebbeck*	30
19	**Emli**	*Tamarindus indica*	455
20	**Tikama**	*Tectona grandis*	95
21	**Kushum**	*Schleichera oleosa*	45
22	**Mango**	*Mangifera indica*	180
23	**Bougainvillea**	*Bouganvilla*	230
24	**Putrunjiva**	*Putranjiva roxburghii*	90

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ANNEXURE-8

Garland Drains, Toe wall & Settling pits

Settling pit

Garland drain

Toe wall

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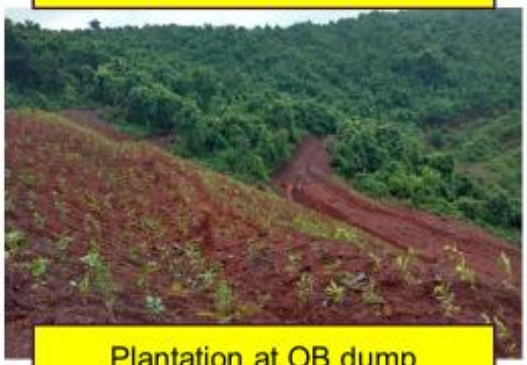
ANNEXURE-9

Green Belt development

Safety zone plantation

Mine road side plantation

Plantation at OB dump



Plantation at OB dump

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ANNEXURE-10

Wet Drilling and Dry Fog System

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ANNEXURE-11

STP/ETP and Oil Catchment Pit

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ANNEXURE-12

CAAQMS and Display Board

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ANNEXURE-13

DUST-FALL ANALYSIS

Analysis Report – De-dusting

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TEST REPORT
(DUSTFALL ANALYSIS ANALYSIS REPORT- NOV-2019)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Env\Ab\19\R-6237	**Report Release Date**	03.12.19
Sample Code	DF-1	**Sampled By**	VCSPL Representative
Sample Name	Dust Fall	**Sampled On**	12.11.2019
Sample Condition	Sealed & Ice Preserved	**Sampling Location**	**Dust Fall-1: Mines Area**
Test Started On	13.11.2019	**Sample Received On**	13.11.2019
		Test Completed On	20.11.2019

DF-1	Analysis Result					
Parameters	**DF (t/km2/month)**	**Ni(%)**	**Co (%)**	**Hg(%)**	**As (%)**	**Fe (%)**
***DF & M**	1.74	1.66	0.032	0.012	<0.001	<0.001

Note Above (*) parameters are not in our NABL scope.
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Analysis Report – De-dusting Unit

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TEST REPORT

(DUST FALL ANALYSIS REPORT- FEBRUARY-2020)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab/1191R-8268	**Report Release Date**	02.03.20
Sample Code	DF	Sampled By	VCSPL Representative
Sample Name	Dust Fall	Sampled On	11.02.2020
Sample Condition	--	Sampling Location	**S1: Mines Area**
Test Started On	12.02.2020	Sample Received On	12.02.2020
		Test Completed On	18.02.2020

SL.No	Parameters	Unit	Analysis Result
1	*Nickel as Ni	%	0.018
2	*Cobalt as Co	%	0.008
3	*Mercury as Hg	%	<0.001
4	*Arsenic as As	%	<0.001
5	*Iron as Fe	%	1.46
6	*Dust Fall	t/km2/month	1.54

Note Above (*) parameters are not in our scope.

1. **The test values are reported based on the samples received.**
2. **Samples will be destroyed after 7 days from date of issues of the test report subject to nature of preservation. Sample will be preserved as per standard method.**
3. **The test report shall not be reproduced, without written approval of laboratory.**

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Authorised Signatory

No.-M-22&23, Chandaka Industrial Estate, Patia, Bhubaneswar-751024, Dist-Khurda, Odisha , Contact No: 7752017905

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Analysis Report – Free silica

Joda East Iron Mine

Date of Sampling	Report No.	Free Silica (%)
07.10.2019	ENV LAB/19/R-5221	0.54
30.11.2019	ENV LAB/19/R-6073	0.58
16.12.2019	ENV LAB/19/R-6855	0.62
12.01.2020	ENV LAB/19/R-7491	0.61
06.02.2020	ENV LAB/19/R-8256	0.68
05.03.2020	ENV LAB/19/R-9217	0.74

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ANNEXURE – I4

AMBIENT NOISE QUALITY AT JODA EAST
AVERAGE OCTOBER 2019 TO MARCH 2020

	Location	**Day Time 8.00 am to 10.00 pm**	**Limits in dB(A) Leq**	**Night Time 8.00 am to 10.00 pm**	**Limits in dB(A) Leq**
Residential area	Hospital Premises	53.34	55.00	41.11	45.00
	Training Centre	53.19		41.86	
	Township	49.92		42.49	
Industrial area	Chief Office	63.27	75.00	58.59	70.00
	Mining area	66.05		60.63	
	Plant area	65.06		62.24	

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ANNEXURE-15

Joda East Iron Mine
Workshop Effluent Quality
October 2019 – March 2020

Parameters	Limit	
	Equipment Maintenance	Limit
pH	6.16	5.5 – 9.0
Suspended Solids mg/l	38.42	100.00
Oil & Grease mg/l	6.70	10.00

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ANNEXURE-16

FLOW RATE AND SURFACE WATER QUALITY

Flow Rate of Kundra Nalla (October'19 – March'20)

ANALYSIS OF WATER QUALITY
Sample collected from Kundra Nalla

Parameters	Oct-19	Nov-19	Dec-19	Jan-19	Feb-19	Mar-19
BOD mg/l	1.60	1.80	1.20	1.30	1.10	1.10
CPCB Limit (30 mg/l)						
TSS mg/l	25.00	21.40	20.20	22.40	23.40	22.40
CPCB Limit (100 mg/l)						
Flow Rate Cum/hr	38.90	37.40	34.80	29.60	28.20	21.30

There is no any industrial effluents discharge from the mine.

Lab-in-charge

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Surface Water Analysis Report
(October 2019 – March 2020)
Joda East Iron Mine

Visiontek Consultancy Services Pvt. Ltd.

(An Enviro Engineering Consulting Cell)

(ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified)

NABL ACCREDITED

Certificate No.: TC-7944
Format No.: 7.8.2/FMT/TR/06

TEST REPORT
(SURFACE WATER QUALITY ANALYSIS REPORT- NOVEMBER-2019)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	ENVLAB/19/R-6234	**Report Release Date**	03.12.2019
Sample Code	SW1-SW2	**Sampled By**	VCSPL Representative
Sample Name	Surface Water	**Sampled On**	12.11.2019
Sample Condition	Ice Preserved	**Sampling Location**	**SW1: Kundra Nallah Upstream** **SW2: Kundra Nallah Downstream**
Test Started On	13.11.2019	**Sample Received On**	13.11.2019
		Test Completed On	20.11.2019

Sl. No.	Parameter	Unit	Testing Methods	Standards as per IS-2296:1992 Class –'C'	Analysis Results	
					SW-1	SW-2
1	Dissolved Oxygen (min)	mg/l	APHA 23RD Ed,2017 : 4500 O C	4.0 -	6.1	6.4
2	Total Suspended Solids as TSS	mg/l	APHA 23RD Ed,2017: 2540 C	--	28	32
3	BOD (3) days at 27°C (max)	mg/l	IS 3025(P-44) : 1993 RA 2003	1500	<1.8	<1.8
4	Chemical Oxygen Demand (COD)	mg/l	APHA 23RD Ed,2017: 5220 C	--	22	26
5	Total Coli form	mg/l	APHA 23RD Ed,2017: 9221 B	5000	120	180
6	pH at 25°C	mg/l	APHA 23RD Ed,2017 4500H+ B	6.0-9.0	7.42	7.48
7	Colour	mg/l	APHA 23RD Ed,2017 : 2120 B, C	300	CL	CL
8	Total Dissolved Solids	mg/l	APHA 23RD Ed,2017: 2540 D	600	192	210
9	Copper as Cu (max)	mg/l	APHA 23RD Ed,2017: 3111 B	1.5	<0.02	<0.02
10	Iron as Fe (max)	mg/l	APHA 23RD Ed,2017: 3500Fe, B	0.5	0.34	0.36
11	Chloride (max)	mg/l	APHA 23RD Ed,2017: 4500Cl- B	--	51.2	56.4
12	Sulphates (SO_4) (max)	mg/l	APHA 23RD Ed,2017: 4500 SO_4^{2-} E	400	5.4	6.8
13	Nitrate as NO_3 (max)	mg/l	APHA 23RD Ed,2017: 4500 NO_3^- E	50	3.4	4.6
14	Fluoride as F (max)	mg/l	APHA 23RD Ed,2017: 4500F- C	1.5	0.012	0.026
15	Phenolic Compounds as C_6H_5OH (max)	mg/l	APHA 23RD Ed,2017: 5530 B,D	0.005	<0.001	<0.001
16	Cadmium as Cd (max)	mg/l	APHA 23RD Ed,2017: 3111 B	0.01	<0.001	<0.001
17	Selenium as Se (max)	mg/l	APHA 23RD Ed,2017: 3500 Se C	0.05	<0.001	<0.001
18	Arsenic as As	mg/l	APHA 23RD Ed,2017: 3114 B	0.2	<0.001	<0.001
19	Cyanide as CN (max)	mg/l	APHA 23RD Ed,2017: 4500 CN- C,D	0.05	ND	ND
20	Lead as Pb	mg/l	APHA 23RD Ed,2017 3111 B	0.1	<0.01	<0.01
21	Zinc as Zn(max)	mg/l	APHA 23RD Ed,2017: 3111 B	15	<0.05	<0.05
22	Hexa Chromium as Cr^{+6}	mg/l	APHA 23RD Ed,2017: 3500Cr B	0.05	<0.05	<0.05
23	Anionic Detergents (max)	mg/l	APHA 23RD Ed,2017: 5540 C	1.0	<0.2	<0.2
24	Mercury as Hg	mg/l	APHA 23RD Ed,2017: 3112 B	--	<0.001	<0.001
25	Manganese as Mn	mg/l	APHA 23RD Ed,2017: 3111 B	--	<0.005	<0.005

Note Above (*) parameters are not in our scope.

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3. **The test report shall not be reproduced, without written approval of laboratory.**

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Surface Water Analysis Report

Visiontek Consultancy Services Pvt. Ltd.

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(ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified)

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Certificate No.: TC-7944
Format No.: 7.8.2/FMT/TR/06

TEST REPORT
(SURFACE WATER QUALITY ANALYSIS REPORT- FEBRUARY-2020)

Customer Name & Address	M/s Joda East Iron Mines (M/s TATA Steel Limited)		
Test Report No	Envlab119/R-8271	**Report Release Date**	02.03.20
Sample Code	SW1-SW2	**Sampled By**	VCSPL Representative
Sample Name	Surface Water	**Sampled On**	04.02.2020
Sample Condition	Ice Preserved	**Sampling Location**	SW-1: Kumarjoda SW-2: Banspani
Test Started On	05.02.2020	**Sample Received On**	05.02.2020
		Test Completed On	11.02.2020

Sl. No.	Parameter	Unit	Testing Method	Standards as per IS 2296:1992 Class C	Analysis Results	
					SW-1	SW-2
1	Dissolved Oxygen (minimum)	mg/l	APHA23rd Edn,2017: 4500 O C	4	6.4	6.8
2	Total Suspended Solids as TSS	mg/l	APHA23rd Edn,2017: 2540 C	--	32	34
3	BOD (3) days at 27°C (max)	mg/l	IS 3025 (P-44) 1993 RA 2003	3	3.2	3.8
4	Chemical Oxygen Demand as COD	mg/l	APHA23rd Edn,2017: 5220 B	--	20	24
5	Total Coli form	MPN/ 100ML	APHA23rd Edn,2017: 9221 B	5000	260	280
6	pH Value	--	APHA23rd Edn,2017: 4500 H+B	6.0-9.0	7.41	7.44
7	Colour (max)	Hazen	APHA23rd Edn,2017: 2120 B,C	300	2	2
8	Total Dissolved Solids	mg/l	APHA23rd Edn,2017: 2540 D	1500	148.0	152.0
9	Copper as Cu (max)	mg/l	APHA23rd Edn,2017: 3111 B,C	1.5	<0.05	<0.05
10	Iron as Fe (max)	mg/l	APHA23rd Edn,2017: 3111 B	0.5	0.38	0.42
11	Chloride (max)	mg/l	APHA23rd Edn,2017: 4500 Cl- B	600	32.0	38.0
12	Sulphates (SO4) (max)	mg/l	APHA23rd Edn,2017: 4500 SO_4^{2-} E	400	4.8	5.6
13	Nitrate as NO3 (max)	mg/l	APHA23rd Edn,2017: 4500 NO_3^- E	50	1.90	1.81
14	Fluoride as F (max)	mg/l	APHA23rd Edn,2017: 4500 F- C	1.5	0.026	0.031
15	Phenolic Compounds as C6H5OH (max)	mg/l	APHA23rd Edn,2017: 5530 B,D	0.005	<0.001	<0.001
16	Cadmium as Cd (max)	mg/l	APHA23rd Edn,2017: 3111 B	0.01	<0.001	<0.001
17	Selenium as Se (max)	mg/l	APHA23rd Edn,2017: 3114 B	0.05	<0.001	<0.001
18	Arsenic as As	mg/l	APHA23rd Edn,2017: 3114 B	0.2	<0.001	<0.001
19	Cyanide as CN (max)	mg/l	APHA23rd Edn,2017: 4500 CN- C,D	0.05	ND	ND
20	Lead as Pb(max)	mg/l	APHA23rd Edn,2017: 3111 B	0.1	<0.01	<0.01
21	Zinc as Zn(max)	mg/l	APHA23rd Edn,2017: 3111 B	15	<0.05	<0.05
22	Hexa Chromium as Cr +6	mg/l	APHA23rd Edn,2017: 3111 B	0.05	<0.05	<0.05
23	Anionic Detergents (max)	mg/l	APHA23rd Edn,2017: 5540 C	1	<0.2	<0.2
24	Mercury as Hg	mg/l	APHA23rd Edn,2017: 3112 B	--	<0.001	<0.001
25	Manganese as Mn	mg/l	APHA23rd Edn,2017: 3111 B	--	<0.005	<0.005

Note Above (*) parameters are not in our scope. ***Note: CL: Colorless, ND: Not Detected.***
BDL (Below Detectable Limits) Values: Cu=0.02 mg/l, Mn=0.05 mg/l, C6H5OH=0.05 mg/l, Hg=0.004 mg/l, Cd=0.01 mg/l, Se=0.001 mg/l, As=0.004 mg/l, CN=0.01 mg/l Pb=0.01 mg/l, Zn=0.03 mg/l, Cr+6=0.01 mg/l, Al=0.01 mg/l, B=0.1 mg/l,, Hg=0.001 mg/l, BOD=1.8 mg/l, COD=4 mg/l, DO=1.8 mg/l

1. The test values are reported based on the samples received. 2. Samples will be destroyed after 7 days from date of issues of the test report subject to nature of preservation. Sample will be preserved as per standard method.

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Authorized Signatory

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ANNEXURE-17

Expenses Incurred for Environment Management during Fy 19-20			
Sl. No	**Activity**	**Capital (Rs. In Lakhs)**	**Recurring (Rs.in Lakhs)**
1	Covering stack fines	10	
2	Installation of fixed sprinklers on haul roads	40	
3	Maintennace of existing fixed water sprinkler		20
4	construction of Toe wall & garland drain	30	
5	Maintenance of toe wall & garland drain		15
6	Cleaning & desilting of check dam		15
7	Mobile water sprinkling arrangements		20
8	Dust supression Nalco chemicals		15
9	Operation and Maintenance of dry fog system		130
10	Purchase of spare parts of dry fog system	10	
11	Maintenance of vertiver plantation	10	
12	Maintenance of rain water harvesting structures		15
14	Operation and Maintenance of STP	20	
16	Plantation & Its maintenance		30
17	operation & Maintenance of biomedical waste facilities	15	
18	Housekeeping of plant & Township		150
19	Development & execution for monsoon preperation plan	20	
20	Expenses incurred for Environment awareness sessions	20	
	Total	**175**	**410**

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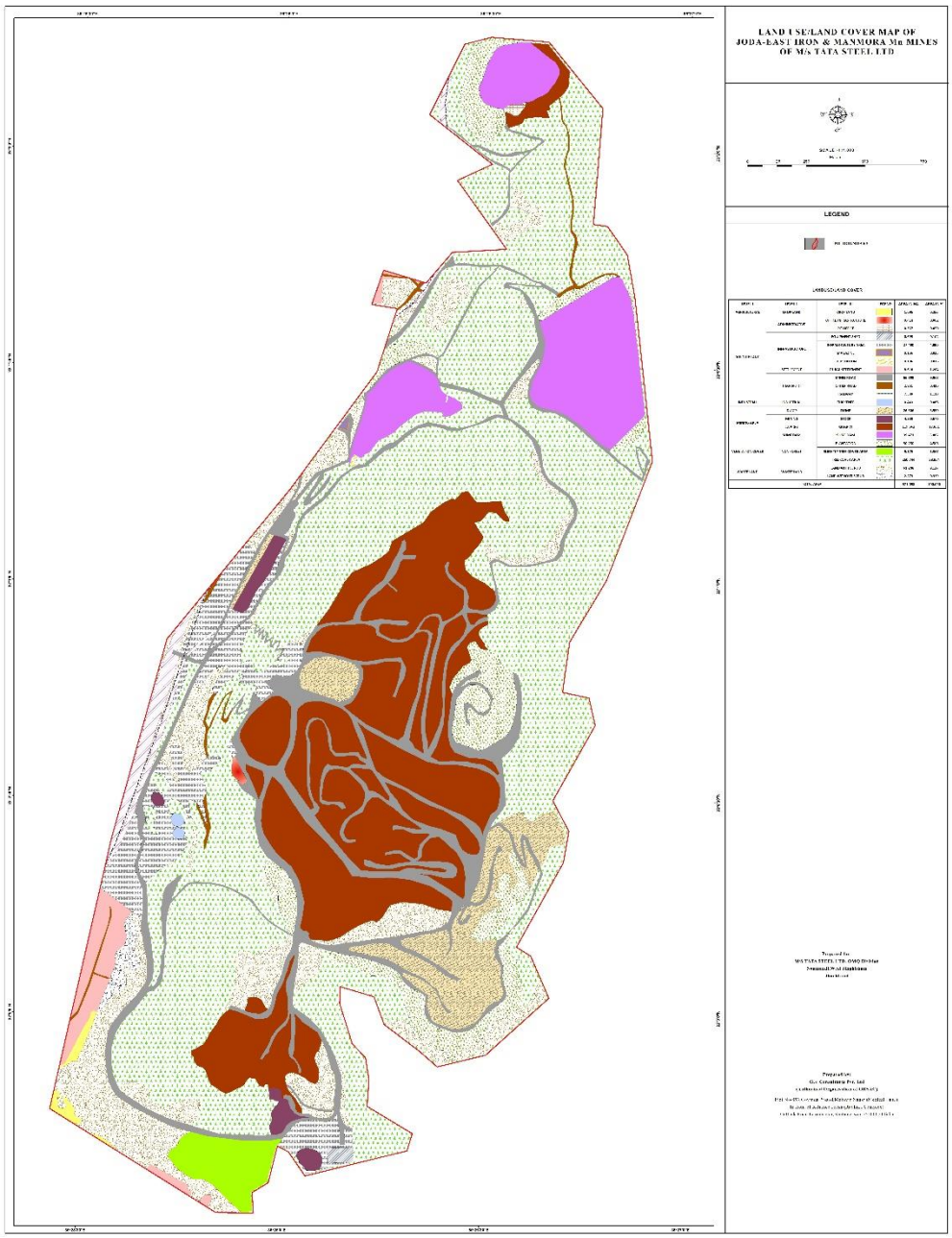
ANNEXURE-18

Land Use Land Cover Maps of Joda East Iron Mine

LAND USE LAND COVER MAP FOR FY-20



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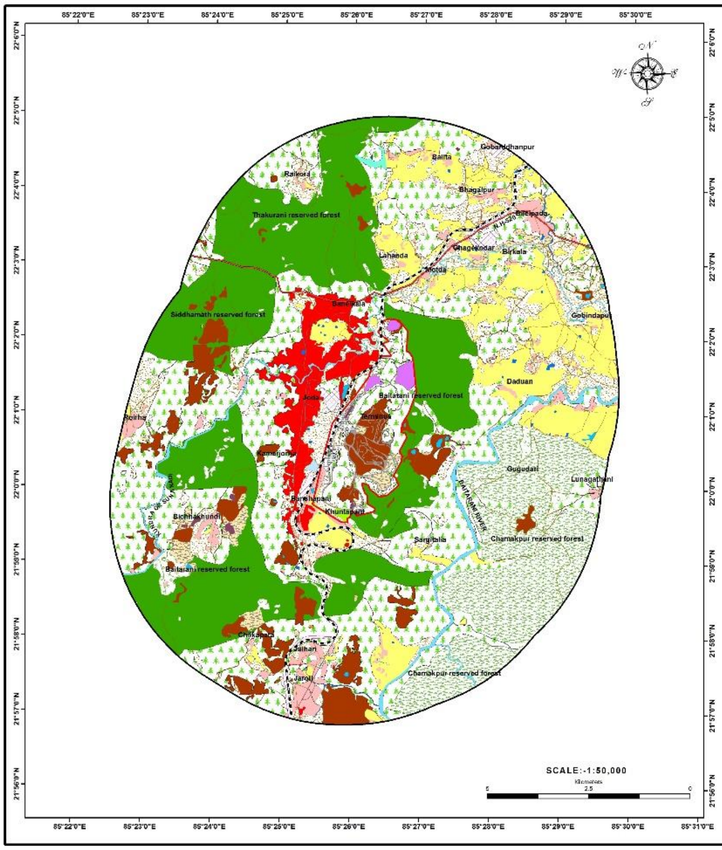
LAND USE LAND COVER MAP BUFFER ZONE FY-20



LAND USE/LAND COVER MAP OF JODA-EAST IRON & MANMORA Mn MINES OF M/s TATA STEEL LTD

LEGEND

ML BOUNDARY BUFFER ZONE-5KM

LANDUSE/LAND COVER

LEVEL-I	LEVEL-II	LEVEL-III	LEGEND	AREA IN HA	AREA IN %
AGRICULTURAL	CROP LAND	CROP LAND		1453.469	9.931
BUILT-UP LAND	ADMINISTRATIVE	OFFICE INFRASTRUCTURE		0.414	0.003
		PIT OFFICE		0.337	0.002
	INFRASTRUCTURE	EQUIPMENT SHED		0.695	0.005
		GODOWN		0.488	0.003
		INFRASTRUCTURE AREA		27.645	0.189
		MAGAZINE		1.417	0.010
	SETTLEMENT	SUB STATION		0.106	0.001
		RURAL SETTLEMENT		410.005	2.801
		URBAN SETTLEMENT		463.769	3.169
	TRANSPORT	MAJOR ROAD		12.246	0.084
		MINES ROAD		67.109	0.459
		MINOR ROAD		9.929	0.068
		NATIONAL HIGHWAY		11.322	0.077
		OTHER ROAD		147.185	1.006
		RAILWAY		71.141	0.486
		RAILWAY SIDING		1.495	0.010
INDUSTRIAL	INDUSTRIAL	INDUSTRY		54.330	0.371
		THICKENER		0.443	0.003
MINING AREA	DUMP	DUMP		172.392	1.178
	MINING	STOCK		15.130	0.103
	QUARRY	QUARRY		805.677	5.505
	SLIME DAM	SLIME DAM		39.458	0.270
RECREATIONAL	RECREATIONAL AREA	PARK/PLAY GROUND		4.951	0.034
VEGETATION COVER	FOREST	DENSE FOREST		3296.227	22.521
		OPEN FOREST		1524.099	10.410
		SCRUB FOREST		183.831	1.256
	NON FOREST	PLANTATION		34.411	0.235
		SLIGHTLY TREE COVER AREA		9.358	0.064
		TREE COVER AREA		4266.241	29.140
WASTE LAND	WASTE LAND	LAND WITH SCRUB		1289.831	8.813
		LAND WITHOUT SCRUB		8.985	0.061
WATER BODY	WATER BODY	NALA		12.238	0.084
		POND		14.167	0.097
		RESERVOIR		14.001	0.096
		RIVER		185.565	1.268
		TRAILING POND		5.347	0.037
		WATER BODY		18.547	0.127
		WATER LOGGED AREA		1.258	0.009
TOTAL AREA				14636.138	100.000

Prepared for:
M/S TATA STEEL LTD. OMQ Division
Noamundi,West Singhbhum
Jharkhand

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